



Fairfax County *Wastewater Management*

Reclaimed Water Management Plan

June 2010



CDM



Fairfax County Reclaimed Water Management Plan

Contents

Section 1: Introduction

1.1	Background.....	1-1
1.2	Purpose.....	1-1
1.3	Report Outline.....	1-2

Section 2: Reclaimed Water System

2.1	Reclaimed Water Source	2-1
2.1.1	Significant Industrial Users	2-4
2.2	Reclaimed Water Usage.....	2-4
2.3	Reclaimed Water Service Area.....	2-5
2.3.1	Proposed Reclaimed Water Demands.....	2-5
2.3.2	Proposed Pipe Routing.....	2-12
2.3.3	Reclaimed Water Pump Station	2-12
2.3.4	Reclaimed Water Filling Station.....	2-12
2.3.5	Reclaimed Water Storage	2-12
2.3.6	Public Water Supply Wells and Springs.....	2-14
2.3.7	Public Water Supply Intakes	2-14
2.4	Reclaimed Water Balance	2-14

Section 3: Regulatory Considerations

3.1	Reclaimed Water Treatment Levels	3-1
3.2	Reclaimed Water Monitoring Requirements	3-3
3.2.1	Bacteria	3-3
3.2.2	Total Residual Chlorine.....	3-4
3.2.3	pH.....	3-8
3.2.4	CBOD ₅	3-8
3.2.5	Turbidity.....	3-9
3.2.6	End User Notification.....	3-10

Section 4: Implementation Strategy

4.1	Implementation Plan	4-1
4.1.1	Public Education Program	4-1
4.1.2	Cross Connection/Backflow Prevention Control Program..	4-2
4.1.3	Standards and Details	4-2
4.1.4	Service Agreements.....	4-3
4.1.5	Bulk Irrigation Users.....	4-3
4.1.6	Reuse Customer Implementation Schedule.....	4-5

Figures

2-1	Fairfax County Wastewater Service Areas	2-1
2-2	NMCCP Process Flow Diagram.....	2-2
2-3	NMCCP Effluent and NPW Flow Summary (mgd)	2-3
2-4	Fairfax County Reuse Service Area	2-7
2-5	Potential Reclaimed Water Customers	2-8
	in Fairfax County Reuse Service Area	
2-6	Location of Filling Station	2-13
2-7	Location of Reclaimed Water Storage Tank	2-13
2-8	NMCCP Reclaimed Water Balance (Annual Basis)	2-15
3-1	NMCCP E. coli Summary	3-4
3-2	NMCCP Chlorine Injection and Sampling Points.....	3-6
3-3	Reclamation System Process Flow Diagram	3-7
3-4	NMCCP pH Summary	3-8
3-5	NMCCP CBOD ₅ Summary	3-9
3-6	NMCCP Turbidity Summary (Daily Average).....	3-10
4-1	Overview of Reuse Customer Implementation Process	4-6

Tables

2-1	NMCCP Effluent and NPW Flow Summary (mgd)	2-3
2-2	Significant Industrial Users.....	2-4
2-3	Potential Reuse Customer Information.....	2-9
	in Fairfax County Reuse Service Area	
2-4	Irrigation Rates Using Penman Formula	2-10
2-5	Average Daily Reuse Balance.....	2-16
2-6	Peak Instantaneous Reuse Balance	2-17
3-1	Standards for Reclaimed Water Effluent Limits (VAC).....	3-2
3-2	NMCCP Operational Data Summary (Jan 08 – Jun 09)	3-3

Appendices

<i>Appendix A</i>	Reduced Chlorine Residual Documentation from the VPDES Permit Program Fact Sheet
<i>Appendix B</i>	Cross Connection/Backflow Prevention Program
<i>Appendix C</i>	Reuse Service Agreement Template
<i>Appendix D</i>	Reuse Service Agreement Template – Filling Station
<i>Appendix E</i>	Best Management Practices for Irrigation with Reclaimed Water
<i>Appendix F</i>	Bulk Irrigation Site Plans

Section 1

Introduction

1.1 Background

Fairfax County is seeking to develop a Water Reuse Program for distribution of the Noman M. Cole, Jr., Pollution Control Plant (NMCPCP or the Plant) treated effluent to potential users in certain areas of the southern portion of the County.

Fairfax County is located within the Potomac watershed of the Chesapeake Bay (Bay) and is faced, as are other local jurisdictions, with a nutrient load limit on surface water discharges. Ever-tightening nitrogen and phosphorus loads to the Bay and special Water Quality limits established by the Commonwealth of Virginia (State) require Fairfax County to upgrade NMCPCP for Enhanced Nutrient Removal (ENR) and alternate methods for nutrient reduction. The NMCPCP is currently being upgraded to meet the nutrient requirements set forth by the Chesapeake Bay Regulations. Reuse is one of the alternate methods Fairfax County is using to reduce nutrient discharges and meet their water supply needs.

The Plant is currently permitted at 67 million gallons per day (mgd) annual average daily flow (AADF) and discharges its effluent via an outfall to Pohick Creek, a tributary to the Potomac River. The Biological Nutrient Removal (BNR) treatment and Advanced Wastewater Treatment (AWT) processes at NMCPCP produce an extremely high quality effluent, and it has the potential to serve as a source of additional usable water for industrial and commercial non-potable applications within Fairfax County. The Plant is a participant in the Virginia Environmental Exchange program at the Exemplary Environmental Enterprise (E3) level.



Noman M. Cole, Jr., Pollution Control Plant

1.2 Purpose

The Virginia Water Reclamation and Reuse Regulation (Code 9VAC25-740), effective October 1, 2008, states that a Reclaimed Water Management (RWM) Plan is required for a reclamation system that provides reclaimed water directly to an end user(s). This RWM Plan is being prepared in support of VPDES Permit No. VA0025364, issued by the Virginia Department of Environmental Quality on April, 2008 for the NMCPCP.

The requirements set forth by the State for a RWM Plan, as described in the Virginia Water Reclamation and Reuse Regulation include the following:

1. A description and map of the reclaimed water service area;
2. A current inventory of impoundments, ponds or tanks that are used for system storage of reclaimed water;
3. A water balance model;
4. An example of service agreements or contracts to be established by the applicant or permittee with end users;
5. A description of a program to monitor end users;
6. An education and notification program;
7. A cross connection and backflow prevention program; and
8. A description of how the quality of reclaimed water in the reclaimed water distribution system shall be maintained to meet the standards for the intended reuse or reuses of the reclaimed water.

In accordance with the above permit requirements, this RWM Plan for the NMCPCP outlines Fairfax County's planned reclaimed water system including production, storage, and distribution of high quality reclaimed water for non-potable use. The future system will provide reclaimed water for industrial and commercial facilities within Fairfax County.

1.3 Report Outline

The content of this report is divided into four sections and appendices as described below:

- Section 1: Introduction
- Section 2: Reclaimed Water System – Discusses the proposed reclaimed water system including the water balance model, potential reclaimed water customers, supplies, and demands.
- Section 3: Regulatory Considerations – Describes the reclaimed water treatment level requirements and monitoring requirements for bacteria, pH, turbidity, BOD₅ and TSS.
- Section 4: Implementation Strategy – Summarizes programs necessary to implement the reclaimed water system including public education program, cross connection program, back flow prevention program, service agreements, and customer contracts.

- Appendices – Documents required by the VA Reuse Regulations to meet the requirements.

Section 2

Reclaimed Water System

2.1 Reclaimed Water Source

Fairfax County serves 340,000 residents and business with sanitary sewer service within Fairfax County, Virginia. The total system can collect and treat 161 mgd of wastewater and covers an area of nearly 234 square miles. Fairfax County currently provides wastewater service through nearly 3,300 miles of sewer and 62 pump stations located throughout Fairfax County. The County currently operates one wastewater treatment plant and through inter-jurisdictional agreements, the County sends portions of their flow to six other treatment plants. Figure 2-1 shows the Fairfax County wastewater service area and the approximate location of the NMCCPCP (the Plant).

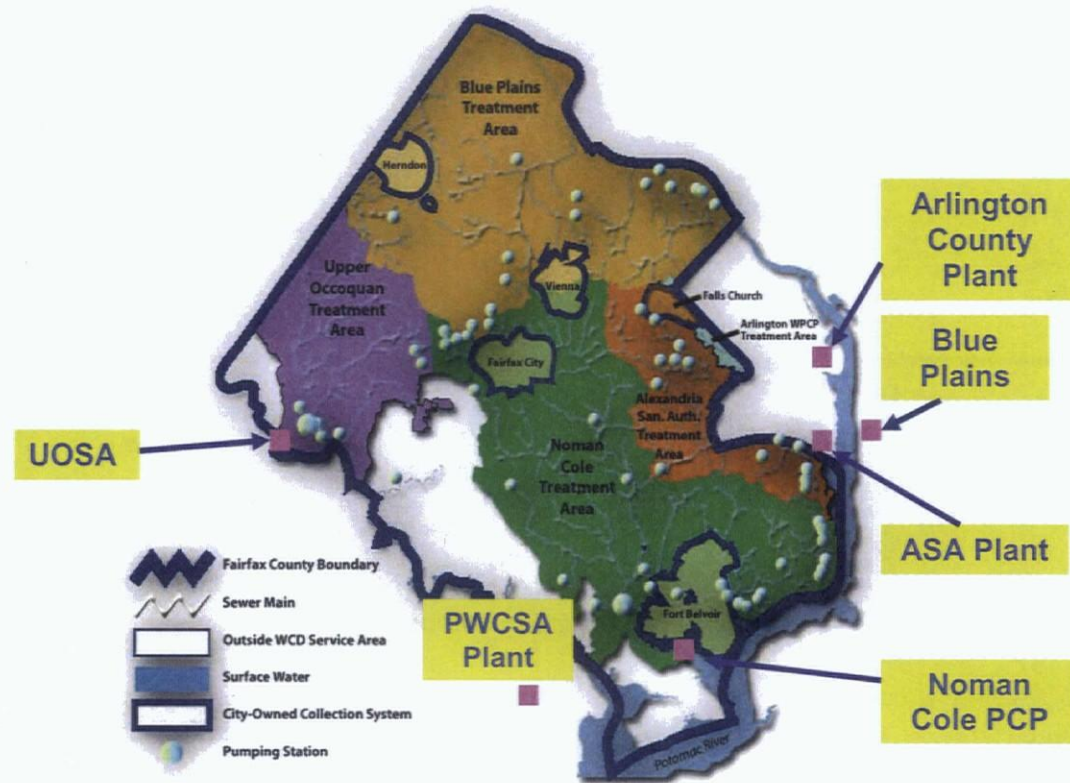


Figure 2-1
Fairfax County Wastewater Service Areas

The Plant has a design capacity of 67 mgd and is currently a BNR wastewater treatment facility consisting of preliminary treatment (mechanical screening), primary sedimentation, secondary treatment (biological nutrient removal, polymer addition, followed by secondary sedimentation), and advanced wastewater treatment (chemical addition/sedimentation followed by filtration). Disinfection is achieved using sodium hypochlorite, and the effluent is dechlorinated with sodium bisulfite prior to

discharge. A simplified process flow diagram is displayed in Figure 2-2. The average daily effluent flows (ADF) and average non-potable water (NPW) flow for NMCCPCP are displayed in Table 2-1 and Figure 2-3. NPW is chlorinated, treated effluent used on-site for non-potable purposes. NPW is distributed on-site by the Advanced Plant Water (APW) pump station.

Wastewater Treatment Process

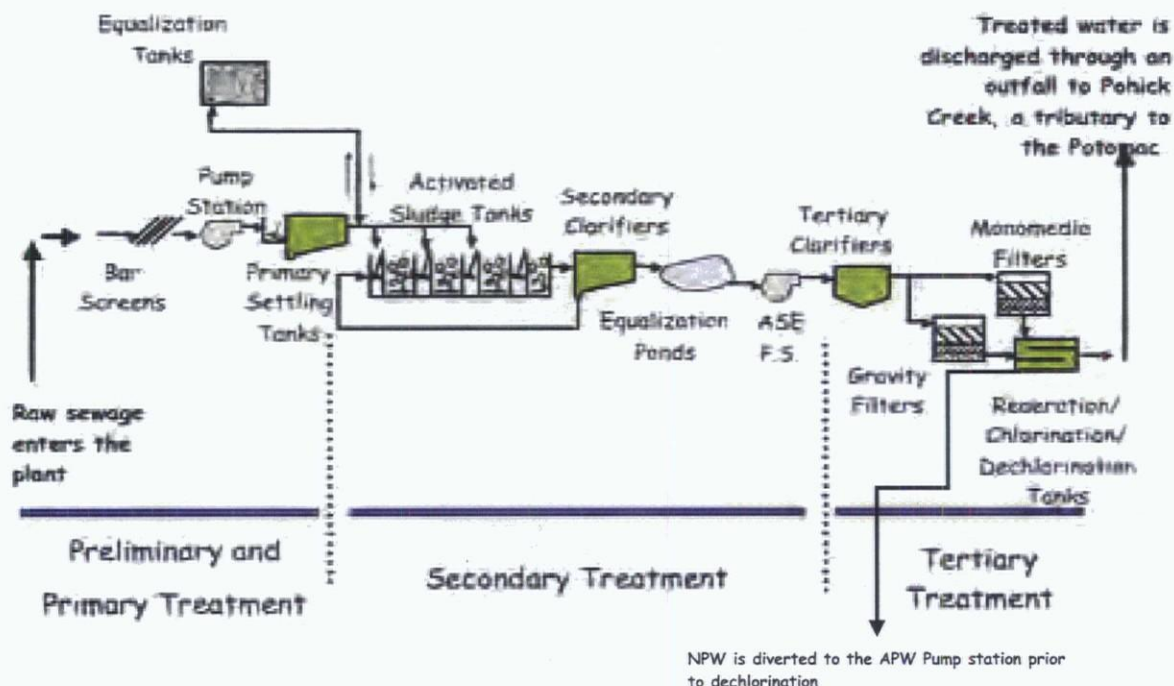


Figure 2-2
NMCCPCP Process Flow Diagram

The NMCCPCP is currently permitted to discharge high quality effluent via an outfall to Pohick Creek, a Class III tributary to the Potomac River. Per Virginia Code 9VAC25-220-120, the designated uses for Class III surface water include, but are not limited to, *"recreation, navigation, and cultural and aesthetic values."* Current plans include utilizing this high quality effluent as a source for a reuse water system within the Fairfax County service area, as further described in Section 2.3.

Implementing a reuse program at the NMCCPCP will provide benefits to Fairfax County including an offset of current potable water use, postponement of wastewater treatment capital expenditures, and possible nutrient exchange options. Fairfax

Table 2-1
NMCPCP Effluent and NPW Flow Summary (mgd)

	Plant Flow mgd	NPW Flow mgd
January-08	38.05	2.84
February-08	40.70	2.89
March-08	40.76	3.27
April-08	43.96	3.13
May-08	50.20	3.25
June-08	44.92	3.69
July-08	40.42	3.30
August-08	37.53	3.56
September-08	44.21	3.77
October-08	36.79	2.99
November-08	36.97	3.10
December-08	39.33	3.26
January-09	39.57	2.72
February-09	37.91	2.89
March-09	38.71	3.02
April-09	42.77	2.80
May-09	45.26	3.67
June-09	45.39	4.07
ADF	41.30	3.23

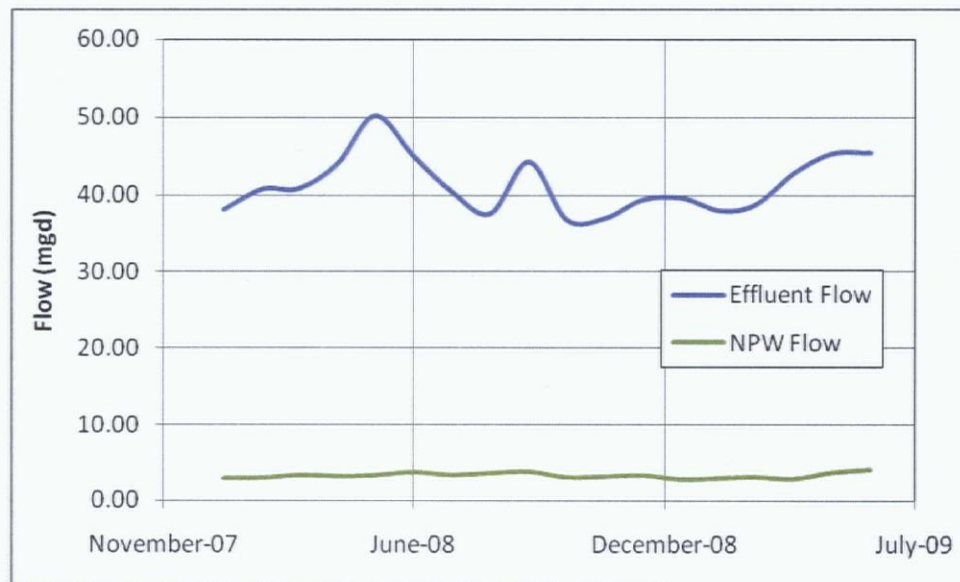


Figure 2-3
NMCPCP Effluent and NPW Flow Summary (mgd)

County has begun implementation of a reuse system and is planning for a new reclaimed water main and storage tank to support a reuse system in the NMCCPCP service area.

2.1.1 Significant Industrial Users

Table 2-2 lists the significant industrial users that contribute wastewater to NMCCPCP and identifies the SIC Code/Description and NAICS Code/Description.

Table 2-2
Significant Industrial Users

Significant Industrial User	SIC Code/Description	NAICS Code/Description
Alexandria Coatings, LLC (Alexandria Metal Finishers, Inc.) 9418 Gunston Cove Road Pretreatment	3471 Electroplating, Anodizing & Painting	332813 Electroplating, Anodizing & Painting
Covanta Fairfax, Inc. 9898 Furnace Road No Pretreatment	4953 Refuse Systems (Incineration)	562213 Solid Waste Combusters
Shenandoah's Pride Dairy 5325 Port Royal Road Pretreatment	2026 Fluid Milk 2024 Ice Cream	311514 Fluid Milk Manufacturer 31152 Ice Cream Manufacturer
Tek Am Corporation 5424 Port Royal Road No Pretreatment	3479 Coating Engraving 3599 Metal Furniture / Metal Shop	332812 Metal Coating 332710 Machine Shop
Krispy Kreme Doughnut Corp 10400 Furnace Road Lorton, VA	5461 Bakery Retail	445291 Bakery Retail
Ener Sol Technologies, Inc., 9406-B Gunston Cove Road, Lorton, Virginia 22079	3541 Machine Tools	333513 Machine Tools

2.2 Reclaimed Water Usage

Per the Virginia Water Reclamation and Reuse Regulation (Code 9VAC25-740-90), there are six major reuse categories, which include:

- Urban (unrestricted access);
- Irrigation (Unrestricted access);
- Irrigation (Restricted access);
- Landscape impoundments;
- Construction; and
- Industrial.

Each reuse category is defined with one of two acceptable treatment levels with minimum standard requirements based on their potential for human contact. Level 1 requires secondary treatment with filtration and a higher level of disinfection and includes different types of urban unrestricted access uses including: landscape

irrigation in public access areas, non-residential toilet flushing, fire fighting, or protection and fire suppression in non-residential buildings, outdoor domestic or residential reuse, commercial car washes and air conditioning systems. In addition, irrigation of unrestricted access, specific industrial uses, and landscape impoundments with potential for public access must meet effluent requirements covered in Level 1 standards. Level 2 requires secondary treatment and standard disinfection and includes restricted access irrigation, construction, landscape impoundments with no potential for public access or contact, and some types of industrial uses.

The NMCPCP achieves Level 1 standard requirements for reclaimed water through its BNR and AWT practices. Therefore, due to its exceptionally high quality effluent, the Plant is capable of providing reclaimed water (up to its design capacity) for all six major categories according to the specific application and demand identified by each potential reuse customer.

2.3 Reclaimed Water Service Area

Figure 2-4 shows the Fairfax County's proposed reclaimed water service area. Figure 2-5 shows the reclaimed water service area along with potential reuse customers (identified as of September 2009).

2.3.1 Proposed Reclaimed Water Demands

Over the past several years, Fairfax County has examined the feasibility of using reclaimed water from NMCPCP. The project team worked with County planners to create a list of all potential reuse customers within three miles of NMCPCP. This list was reduced based on usage rates and future capacity estimates. Peaking factors were also applied to determine potential main segments/trunk lines and possible pumping and distribution needs. The feasibility reported provided the basis for the reuse water service area. Figure 2-5 and Table 2-3 identify potential reclaimed users within the Fairfax County service area. Table 2-3 shows the anchor and potential reuse customers, reuse category for each customer, estimated annual reuse volume, estimated peak flows, estimated average daily flow during low demand periods, and total flows for each reuse category and for the service area.

The following anchor reuse customers have been identified by the County:

- Covanta Energy/Resource Recovery Facility (E/RRF), operated by COVANTA FAIRFAX, INC.
- Laurel Hill Golf Course and the Lower Potomac Park, owned and operated by the Fairfax County Park Authority, an independent Authority (owner/operator).

The area between the NMCPCP and the Covanta E/RRF plant and surrounding area constitutes the proposed reuse water service area. As shown on Figure 2-5, several

other potential customers have been identified, including Fort Belvoir, South County Secondary School, Cardinal Concrete Co., and Newington Concrete Corp.

At the time of the submittal of this RWM plan, Fairfax County was moving forward with discussions to provide reclaimed water to the Covanta E/RRF. The Covanta E/RRF is projected to use an average of 1,460 gpm (2.1 mgd) of reclaimed water for cooling towers.

By regulation, the use of reclaimed water for irrigation must be supplemental and is defined as "irrigation, which in combination with rainfall, meets but does not exceed the water necessary to maximize production or optimize growth of the irrigated vegetation" to which it is applied. To determine the supplemental irrigation rate, a number of calculation equations are available that account for evapotranspiration, vegetation growing periods, average precipitation, and other data. The Penman method of estimating will be used for the NMPCP reuse program. This method includes the following equation:

$$Ir = ((ET_p * Kc) - r_e), \text{ where,}$$

Ir = irrigation requirement

ET_p = potential evapotranspiration for clipped grass in inches per day (in/d)

Kc = crop coefficient for turf grass (typical value 0.6 to 0.8)

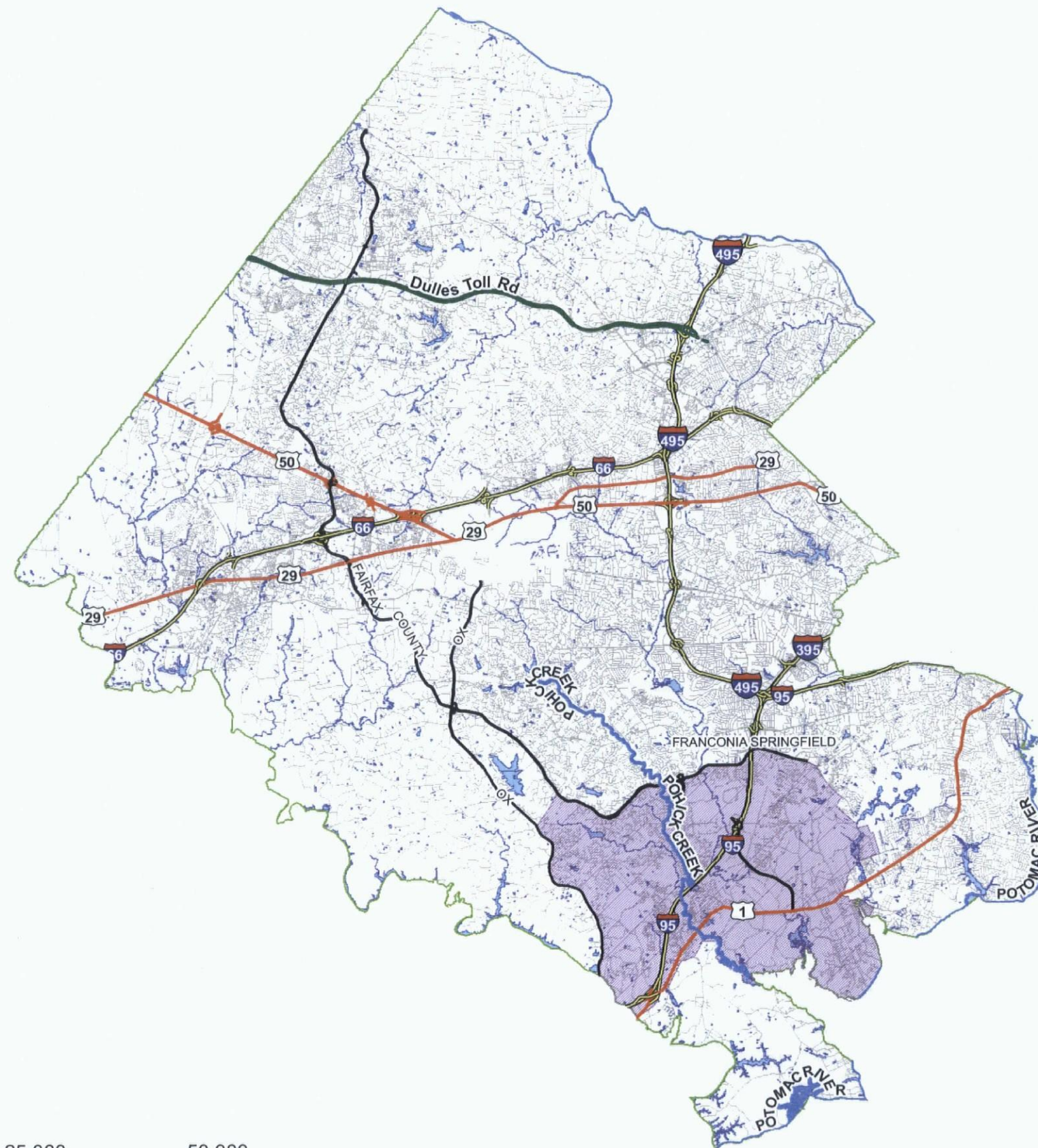
r_e = effective precipitation coefficient (typical value .15 to .51, use .5 for this area)

Using the above calculation the following Seasonal Reuse Water flows are taken from Table 2-4 at the end of this section.

LOCATION	SEASONAL REUSE WATER FLOW (GALLONS)
LAUREL HILL GOLF COURSE	25,575,000
LAUREL HILL RECREATION AREA	11,367,000
LOWER POTOMAC PARK	7,104,000

Irrigation rates are calculated for a particular time of year and location using regional average values for each of the parameters in the Penman method. The irrigation rate will then be electronically recorded to demonstrate that the rate remains supplemental for every day that irrigation occurs with reclaimed water. NMPCP staff will review the recorded irrigation flows to ensure that only supplemental irrigation is practiced.

The two Park locations, Laurel Hills Golf Course and Lower Potomac Park have similar parameters such as vegetation, annual daytime hours, and temperatures. Using factors obtained from the National Engineering Handbook, Part 623, the following tables were created to account for total usage. See attached Table 2-4.



Legend

- Reuse Service Area
- Fairfax County
- River and Stream
- Toll Road
- Interstate Highway
- State Highway
- Major Road;
- Roads

0 12,500 25,000 50,000
Feet



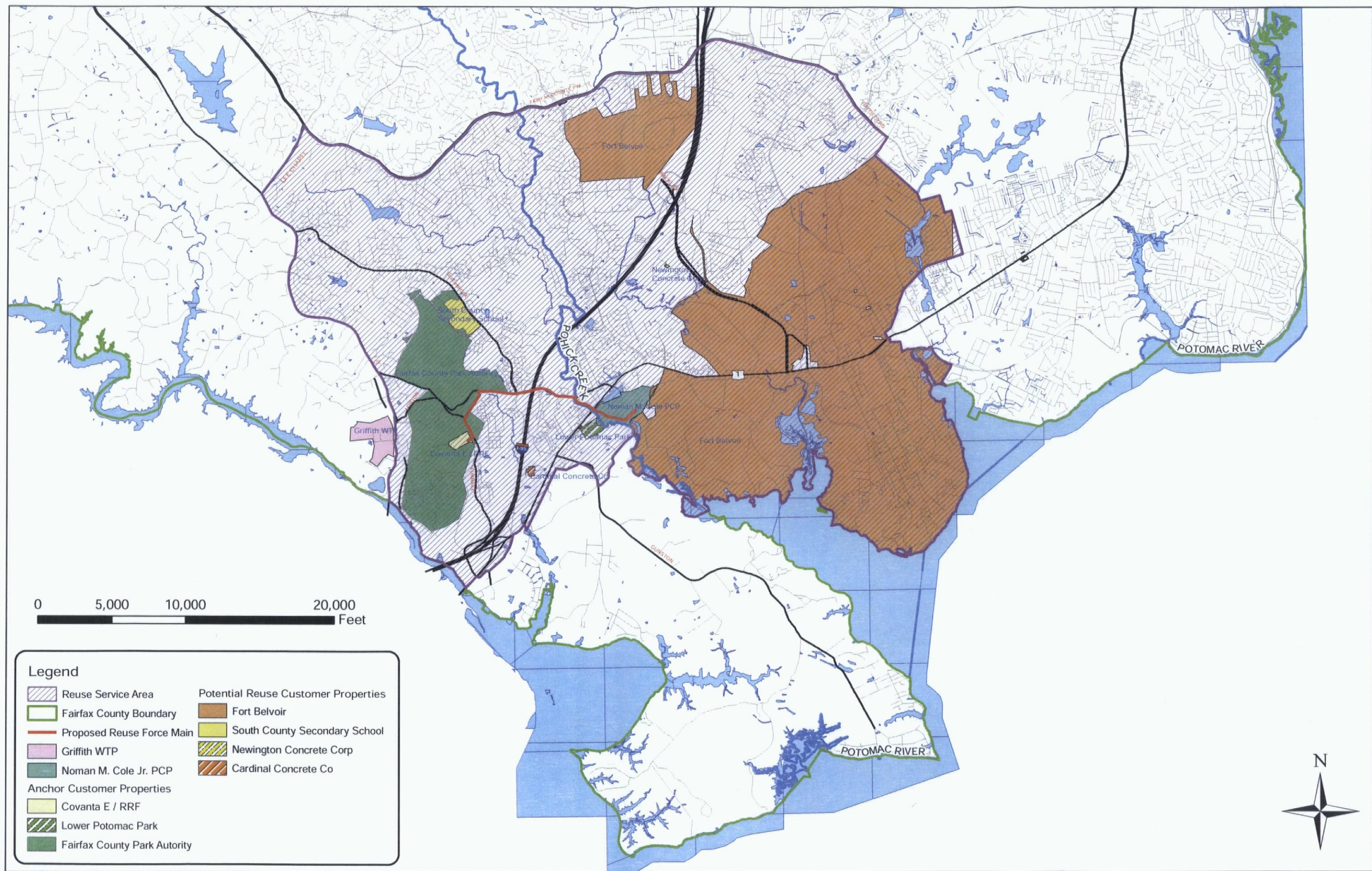


Table 2-3
Potential Reuse Customer Information in Fairfax County Reuse Service Area

	Reuse Category	Uses	Est. Annual Reuse Volume (MG)	Est. Instantaneous Peak Reuse (GPM)	Est. ADF During Low Demand Periods (MGD)
Anchor Customer:					
Covanta E/RRF 9898 Furnace Road Lorton, VA	6	Cooling Tower	766.5	2,085	1.68
FCPA Laurel Hill Golf Course	1	Recreation Fields / Golf Course	11.4 ¹ / 25.6 ¹	800	0
FCPA Lower Potomac Park	1	Recreation Fields	7.1 ¹	231	0
Potential Reuse:					
Fort Belvoir	6	Cooling Tower	350 ⁴	1,000	Unknown
South County Secondary School 8501 Silverbrook Road Lorton, VA 22079	1	Recreation Fields	5	Unknown	0
Cardinal Concrete Co 8115 Mims Street Springfield, VA 22150	5	Concrete Batch Plant	6.1 ²	150 ³	0
Newington Concrete Corp 8413 Terminal Road Newington, VA 22122	5	Concrete Batch Plant	6.3 ²	150 ³	0
Total Reuse:					
Reuse Category 1 – Urban – Unrestricted Access			49.1	1,040.5 ⁵	0
Reuse Category 2 – Irrigation – Unrestricted Access			0	0	0
Reuse Category 3 – Irrigation – Restricted Access			0	0	0
Reuse Category 4 – Landscape Impoundments			0	0	0
Reuse Category 5 – Construction			12.4	300	0
Reuse Category 6 – Industrial			1,116.5	3,085	1.68
Total			1,178.0	4,425.5⁵	1.68

Table 2-3 Notes:

¹Flow based on Table 2-4.

²Flow based on average daily flow calculated from Fairfax Water 2005 meter data. 300 days per year operation assumed.

³Flow based on 8-hour shifts, daily maximum estimates and 1.5 peaking factor.

⁴Flow based on 6 million square feet of office space cooled using chillers and cooling towers.

⁵Includes average gpm from South County Secondary School (Based on Estimated Annual Volume)

Table 2-4
Irrigation Rates Using Penman Formula

LAUREL HILL GOLF COURSE					Ir = ((ET _p * Kc) - r _e)				
Month	Potential Evapo- transpiration (ET _p) ¹	Crop Coefficient (Kc) ²	Average Precip (inches) ³	Effective Precip (re) Coeff ⁴	Ir (inches)	Acres	Acre- inches	Acre Conv. ⁵	Gallons
April	2.13	0.75	2.93	0.5	0.13	90	12	27,154	323,811
May	3.87	0.75	3.48	0.5	1.16	90	105	27,154	2,840,987
June	5.5	0.75	3.35	0.5	2.45	90	221	27,154	5,987,457
July	6.51	0.75	3.88	0.5	2.94	90	265	27,154	7,191,058
August	5.84	0.75	4.4	0.5	2.18	90	196	27,154	5,327,615
September	4.06	0.75	3.22	0.5	1.44	90	129	27,154	3,506,939
October	2.15	0.75	2.9	0.5	0.16	90	15	27,154	397,127
Seasonal Flow (gallons)									25,574,995
LAUREL HILL RECREATION AREA					Ir = ((ET _p * Kc) - r _e)				
April	2.13	0.75	2.93	0.5	0.13	40	5	27,154	143,916
May	3.87	0.75	3.48	0.5	1.16	40	47	27,154	1,262,661
June	5.5	0.75	3.35	0.5	2.45	40	98	27,154	2,661,092
July	6.51	0.75	3.88	0.5	2.94	40	118	27,154	3,196,026
August	5.84	0.75	4.4	0.5	2.18	40	87	27,154	2,367,829
September	4.06	0.75	3.22	0.5	1.44	40	57	27,154	1,558,640
October	2.15	0.75	2.9	0.5	0.16	40	6	27,154	176,501
Seasonal Flow (gallons)									11,366,664

Table 2-4
Continued

LOWER POTOMAC PARK				$Ir = ((ET_p * Kc) - r_e)$					
Month	Potential Evapo- transpiration (ET_p) ¹	Crop Coefficient (Kc) ²	Average Precip (inches) ³	Effective Precip (re) Coeff ⁴	Ir (inches)	Acres	Acre- inches	Acre Conv. ⁵	Gallons
April	2.13	0.75	2.93	0.5	0.13	25	3	27,154	89,948
May	3.87	0.75	3.48	0.5	1.16	25	29	27,154	789,163
June	5.5	0.75	3.35	0.5	2.45	25	61	27,154	1,663,183
July	6.51	0.75	3.88	0.5	2.94	25	74	27,154	1,997,516
August	5.84	0.75	4.4	0.5	2.18	25	55	27,154	1,479,893
September	4.06	0.75	3.22	0.5	1.44	25	36	27,154	974,150
October	2.15	0.75	2.9	0.5	0.16	25	4	27,154	110,313
Seasonal Flow (gallons)									7,104,165

1 Provided locally from University of Virginia Meterological Data

2 Crop coefficient from Penman formula

3 Reagan National Airport WSO data

4 Average precip coefficient - Connecticut DEP Best Management Practice for Golf Course Water, 2006.

5 Conversion from acre-inches to gallons

Pursuant to the *Water Guidance Memo No. 10-2001, Implementation Guidance for the Water Reclamation and Reuse Regulation, 9VAC25-740-10 et seq.*, supplemental irrigation allows the application of water in addition to that volume lost to evapotranspiration by the crop where the additional water will “maximize production or optimizes growth of the irrigated vegetation.” This allows the use of additional reclaimed water to prevent the accumulation of salt in the soil resulting from supplemental irrigation. In the event that it is demonstrated that salt has accumulated or will accumulate to undesirable levels in the soil of the irrigation reuse site, the irrigation rate will be temporarily increased by 10% of the water lost to evapotranspiration, provided that the addition of reclaimed water has not and will not contribute to the salt problem.

2.3.2 Proposed Pipe Routing

Hydraulic modeling has been conducted by Fairfax County and a proposed pipe route has been determined based on the potential customers identified. The proposed route includes a new 15,000 feet 20-inch transmission main from NMCCP to the Covanta E/RRF Plant cooling towers with a new reuse pump station located at NMCCP. Future main extensions and service connections from the Fairfax County reuse pipeline to other reuse customers will be constructed in accordance with Fairfax County Reuse Standards and the Virginia Water Reclamation and Reuse Regulation (Code 9VAC25-740-120). A map showing the proposed pipe routing was presented on Figure 2-5.

2.3.3 Reclaimed Water Pump Station

Two new reclaimed water pumps will be installed in the existing APW pump station. These pumps will provide reclaimed water to the reclaimed water distribution system at a flow rate of 4,600 gpm (6.6 mgd).

2.3.4 Reclaimed Water Filling Station

A reclaimed water filling station hydrant will provide reclaimed water for a limited number of customers not directly connected to the reclaimed water distribution system. The location of the filling station is shown on Figure 2-6. Customers will be able to fill a tank truck with reclaimed water and transport it off site for an approved reuse. Reclaimed water filling station customers will be permitted under a standard agreement that is discussed further in Section 4, and will be required to record their discharge of reclaimed water in a manner similar to those using the septage receiving facility. Usage of the hydrant will be monitored by a flow meter.

2.3.5 Reclaimed Water Storage

A proposed totally enclosed storage tank will store 500,000 gallons of reclaimed water located on the Covanta E/RRF site, as shown on Figure 2-7. A second totally enclosed reclaimed water storage tank may be added to the site in the future if demand increases.



Figure 2-6
Location of Filling Station (Source: Google™ Earth Pro)



Figure 2-7
Location of Reclaimed Water Storage Tank (Source: Google™ Earth Pro)

2.3.6 Public Water Supply Wells and Springs

No public water supply wells or springs are located within Fairfax County's Reclaimed Water Service Area.

2.3.7 Public Water Supply Intakes

There are no public water intakes within Fairfax County's Reclaimed Water Service Area.

2.4 Reclaimed Water Balance

Water balance modeling is an important planning tool when developing a water reuse system. Depending on the specific utility, water balance models can range from as simple as a balance between the supply and demand to as intricate as a model that takes into account soil infiltration characteristics, rainfall, peaking factors, and wet weather storage. A model should take into account the supplies to the system, which will include the effluent flow from the pollution control plant, as well as any supplemental water from an additional source or purchased from another utility. A comprehensive review of the system identifies the debits on the reclaimed water distribution system; including on-site plant water use, all residential/commercial users, municipal/institutional users, industrial users, and losses through the distribution system.

There are numerous equations to describe the water balance; however, it is most simply expressed as the balance of the inflows, outflows, and the change of storage over time as expressed below:

$$\sum \text{Inflows} = \sum \text{Outflows} + \sum \text{Storage/time} \quad (1)$$

$$\sum \text{Inflows} - \sum \text{Outflows} = \sum \text{Storage/time} \quad (2)$$

A water balance is required in support of the RWM plan that takes into account the following volumes of Reclaimed water:

- Water generated by the reclamation facility (NMCPCP effluent) (designated design flow of the system);
- Water stored in the 0.5 mgd system storage tank;
- Water used by customers. The water balance must include seasonal and annual reclaimed water demand for each user based on projected volumes for new projects or actual volumes for existing projects; and
- Water discharged through a VPDES permitted outfall for reclamation systems.

Figure 2-8 quantifies the above requirements for the NMCPCP reclaimed water balance. Seasonal variability is expected to be minimal for the Covanta E/RRF. The Covanta E/RRF experiences a higher demand in the summer when evaporation of the

cooling water is the highest, but will use significant quantities of reclaimed water year round. The demand from Fort Belvoir is also expected to be year round, but similar to the Covanta E/RRF, it is expected to drop during the winter months; however, the minimum flow is not known at this time. The remaining anchor and potential reuse customers are not expected to require year round reclaimed water. Irrigation is only required during the spring, summer, and fall months. Although the concrete batch plants will be in production most of the year, it is expected that reduce usage will occur at times in the winter months during cold weather. Periodic flushing of the reclaimed water mains during the low demand periods will assure that reclaimed water in the distribution system will continuously meet Level 1 standards. Table 2-3 includes the estimated average daily flow during low demand periods for the Covanta E/RRF.

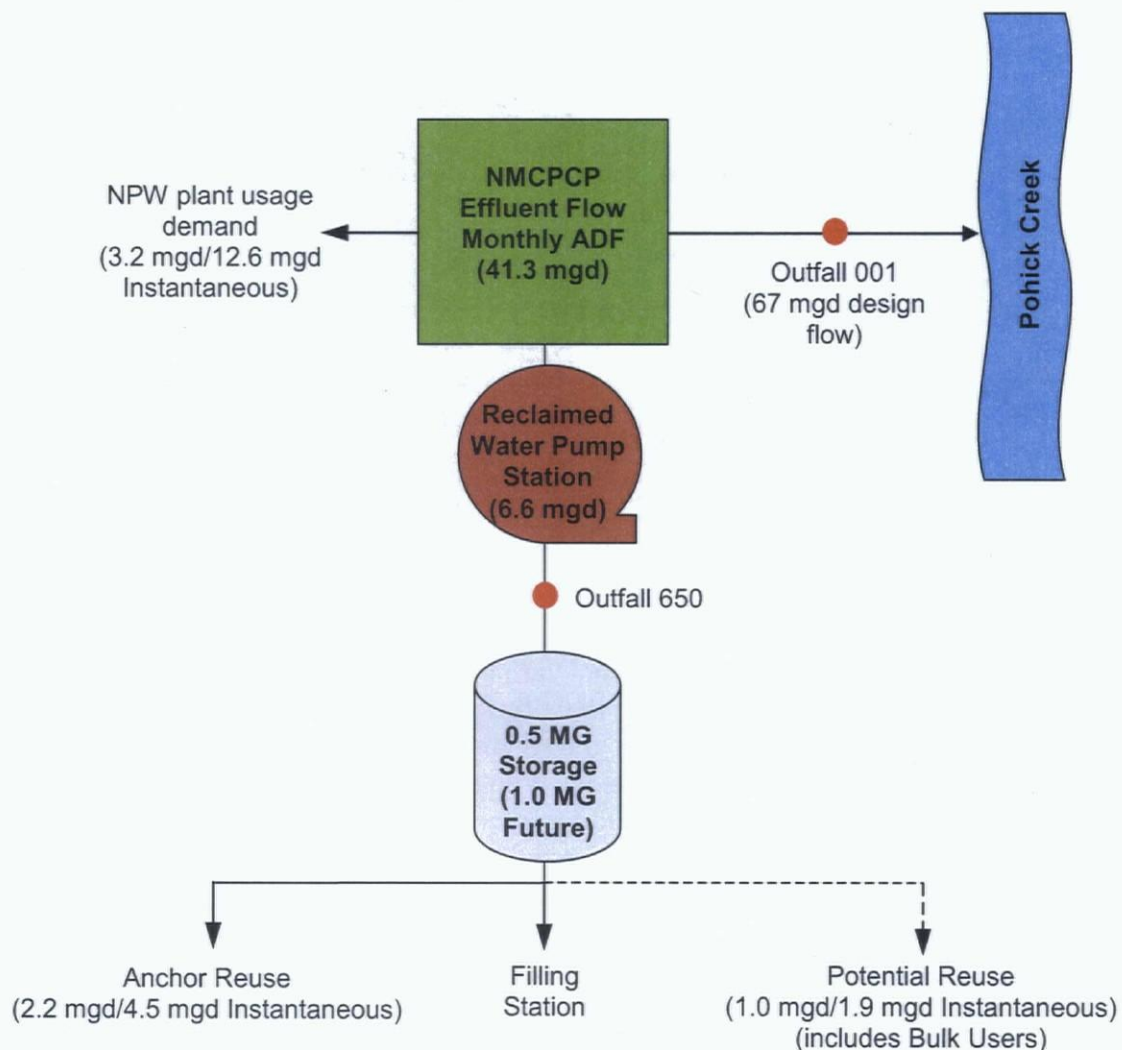


Figure 2-8
NMCCPCP Reclaimed Water Balance (Annual Basis)

There is no current estimation reclaimed water demand from the filling station. Customers were not identified at the time of preparation of this RWM plan. Because

of the limited flows associated with the filling station, it is not anticipated to have a significant impact on the water balance.

The two outflows from the reclaimed water system are the Anchor Reuse and Potential Reuse. If the summation of these flows is greater than the inflow to the reclaimed water system from NMCPCP, then storage is required.

The estimated average daily flows for the discharge from the reclaimed water system are documented in Table 2-5. The reclaimed water inflow is equivalent to the average daily flow at NMCPCP (41.3 mgd from Jan 08-Jun 09, see Figure 2-6) minus the nonpotable water flow used at the Plant. The average inflow is greater than the reclaimed water outflows; therefore, no storage is necessary to meet average daily outflows from the reclaimed water system.

Table 2-5
Average Daily Reuse Balance

Demand	Estimated ADF (mgd)
Anchor Customer	2.2
Potential Customer*	1.0
Total Outflow	3.2
ADF at NMCPCP	41.3
NPW (Plant usage)	(3.2)
Total Inflow	38.1
Balance	34.9

*Includes 10,000 gpd bulk users

The peak instantaneous demand of the reclaimed water system must also be less than the inflow to the reclaimed water system at the time of the peak demand or storage is needed to provide the additional volume of reclaimed water. The average flow through the Plant is not subject to diurnal variations due to the buffering of the EQ Ponds. It is safe to assume the average daily flow at the Plant is equal to the peak instantaneous flow. The total inflow to the reclaimed water system during peak demand is equal to the peak instantaneous flow at the Plant minus the capacity of the APW pump station after the planned addition of the Reclaimed water pump station. The peak demand is equal to the summation of the peak demand of Anchor Reuse and Potential Reuse flows. The peak demand is documented in Table 2-6. The total peak demand is equal to 6.4 mgd, which is less than the inflow (28.7 mgd); therefore, no storage is necessary to meet peak outflows from the reclaimed water system.

Table 2-6
Peak Instantaneous Reuse Balance

Demand	Estimated ADF (mgd)
Anchor Customer	4.5
Potential Customer	1.9
Total Outflow	6.4
ADF at NMCPCP	41.3
NPW (Plant usage)	(12.6)
Total Inflow	28.7
Balance	22.3

The Reclaimed Water Pump Station has a capacity of 6.6 mgd with one pump in operation and one standby. The peak demand for the reclaimed water distribution system is equal to the peak demand of Anchor Reuse (4.5 mgd) and Potential Reuse (1.9 mgd) customers demand. The peak demand of the reclaimed water distribution system is 6.4 mgd which is less than the capacity of the Reclaimed Water Pump Station of 6.6 mgd; therefore, no storage is necessary to meet the reclaimed water distribution system peak demand.

There will be no discharge point from the reclaimed water system; the inflows to the system from the Plant will be controlled to equal the outflow demand. The remaining plant flow (anything in excess of the flow required from the reclaimed water system) will bypass the reclaimed water system and be discharged to Pohick Creek via NMCPCP's current VPDES permitted Outfall 001. If reclaimed water does not meet Level 1 standards, all flow from NMCPCP will bypass the reclaimed water system and be discharged to Pohick Creek via Outfall 001. Flow will not be accepted by the reclaimed water system until Level 1 standards are again achieved. Reclaimed water main flushing will be discharged into a Fairfax County Sanitary Sewer.

Although storage is not necessary to provide a water balance, as discussed above, storage is a necessary component of the reclaimed water distribution system. Without system storage, all pressure and flow in the distribution system would need to be provided by the reclaimed water pumps. System storage allows the pumps to shut down when the distribution system is fully pressurized, allowing for greater energy efficiency. In addition, should any repairs need to be made to the pump station, or should the pumps need to shut down due to a treatment issue, the reclaimed water users will continue to have a reliable source of reclaimed water.

Section 3

Regulatory Considerations

3.1 Reclaimed Water Treatment Levels

The new state regulation, effective October 1, 2008, defines two levels of treatment required for reclaimed water reuse. Level 1 for use on unrestricted access areas includes a minimum of secondary treatment and high level disinfection (consisting of filtration followed by disinfection) and Level 2, for more restricted areas requires a minimum of secondary treatment and standard disinfection. The regulation currently includes prohibitions against direct reuse, interior residential dual water systems, use of reclaimed water for swimming pools and hot tubs, and use of reclaimed water for food preparation.

Water reclamation and reuse from wastewater treatment plants in the Commonwealth of Virginia is regulated by the Virginia Administrative Code (VAC) under 9VAC25-740. Standards for reclaimed water are listed in 9VAC25-740-70. Table 3-1 summarizes reclaimed water standards in the Reuse Regulations.

Level 1 treatment applies to different types of urban unrestricted access uses including: landscape irrigation in public access areas, non-residential toilet flushing, fire fighting or protection and fire suppression in non-residential buildings, outdoor domestic or residential reuse, commercial car washes and air conditioning systems. In addition, irrigation of unrestricted access, specific industrial uses, and landscape impoundments with potential for public access must meet effluent requirements covered in Level 1 standards.

In addition to meeting effluent limits, the State of Virginia requires water reclamation facilities to obtain a Virginia Pollutant Discharge Elimination System (VPDES) permit or a Virginia Pollution Abatement (VPA) permit given the type of discharge. Fairfax County has an existing surface water discharge and the reclamation system will be covered under that VPDES permit.

The NMCPCP currently treats to Level 1 standards, which are summarized in Table 3-1. Fairfax County anticipates providing reuse water to large industrial and commercial users for irrigation, cooling water, and non-residential toilet flushing, as previously described in Section 2.3. In order to properly discharge to the reuse system, the Plant must comply with the standards listed in Table 3-1.

Table 3-1
Standards for Reclaimed Water Effluent Limits (VAC)

Parameter		Level 1		Monitoring Point	Monitoring Frequency	Monitoring Requirements
		Standard	Corrective Action Threshold (CAT)			
Bacterial	Fecal coliform	≤14 colonies/100 mL ^{1,6}	>49 colonies/100 mL	Point of compliance ⁴	Daily, ability to reduce to no less than 4 times a week ⁵	Grab samples taken between 10:00 am and 4:00 pm
	E. coli	≤11 colonies/100 mL ^{1,6}	>35 colonies/100 mL	Point of compliance ⁴		
	Enterococci	≤11 colonies/100 mL ^{1,6}	>24 colonies/100 mL	Point of compliance ⁴		
TRC		-	<1.0 mg/L ^{2,7}	Point of compliance ⁴	Continuous	On-line monitoring at end of contact tank or contact period
pH		6-9	-	Point of compliance ⁴	Daily	Grab
BOD ₅		≤10 mg/L ¹	-	Point of compliance ⁴	At least weekly	Same type and frequency as specified for sewage treatment works in the Sewage Collection and Treatment Regulations 9VAC25-790
CBOD ₅		≤8 mg/L ¹	-	Point of compliance ⁴		
Turbidity		≤2 NTU ³	>5 NTU ³	Just upstream of disinfection	Continuous	On-line monitoring

¹Monthly Geometric Mean

²Contact time of 30 minutes at average flow or 20 minutes at peak flow (Applies only if chlorine is used for disinfection)

³Daily average of discrete measurements recorded over a 24-hr period

⁴Point of Compliance for Level 1 Treatment shall be after all reclaimed water treatment and prior to discharge to a reclaimed water distribution system

⁵Flow greater than 0.5 mgd, for flows below 0.5 mgd refer to Virginia reuse regulations

⁶After disinfection

⁷A TRC less than 1.0 mg/L may be authorized by the board if demonstrated to provide comparable disinfection through a chlorine reduction program in accordance with the Sewage Collection and Treatment Regulations (9VAC25-790)

Operational data for the Plant is summarized in Table 3-2. This table outlines monthly averages for the regulated parameters. During this timeframe, all standards have been met while the treated effluent has been discharged into Pohick Creek. There were no effluent discharge violations during the 2008 calendar year. In 2008, the NMCCP was recognized by the National Association of Clean Water Agencies (NACWA, formerly AMSA) with the Platinum Award for 100% compliance with its VPDES discharge permit limits on a Calendar Year Basis. The Plant has received this award for ten consecutive years. There are only 256 of the 16,000 wastewater treatment plants in the United States that have received this award. Fairfax County continues to be a leader in protecting the Chesapeake Bay and considers this as an initiative for FY 2009. Also, in FY 2007 and 2008, Fairfax County received a Business for the Bay Environmental Excellence Award for the nutrient removal program at the Plant.

Table 3-2
NMCCP Operational Data Summary (Jan 08 - Jun 09)

Effluent Characteristic	Discharge Limits (Monthly Average)	Monthly Average
<i>Escherichia Coli</i> (E. Coli)	126 CFU/100 mL	< 1.0 CFU/100 mL
pH	6.0 - 9.0 s.u.	6.8 s.u.
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	5 mg/L	Below quantification limit
Turbidity FF (Jan 08 - Jul 09, Daily Average)	2.0 NTU	0.65 NTU
Turbidity DD (Jan 08 - Jul 09, Daily Average)	2.0 NTU	0.48 NTU

3.2 Reclaimed Water Monitoring Requirements

3.2.1 Bacteria

At the Plant, grab samples for E. coli will be collected following chlorine disinfection at the new sample station (point of compliance). Samples are taken daily at least four days per week, to comply with the regulations. Bacterial sampling occurs between 10 a.m. and 4 p.m. to coincide with plant peak flows. Compliance with the geometric mean standards for E. coli is determined monthly, based on bacteriological monitoring results for that month. As summarized in Table 3-1, current effluent data from the Plant shows an average of <1.0 cfu/100 mL. The minimum value during the same time frame was <1 cfu/100 mL, while the maximum value resulted in 1.1 cfu/100 mL (January 2008 and March 2008).

If the Bacterial results come within 10% of the CAT limit, the operator will initiate a review of treatment operations and associated disinfection data to identify the cause of the increased Bacterial sampling results, with the intent to bring the system back into compliance. An elevated result approaching the Bacterial CAT will not initiate an

automatic diversion of flow away from the reclaimed water distribution system, but a diversion may be necessary if the reclaimed water does not remain in compliance.

Figure 3-1 is a graphical representation of the current *E. coli* sample results and the regulated maximum limits.

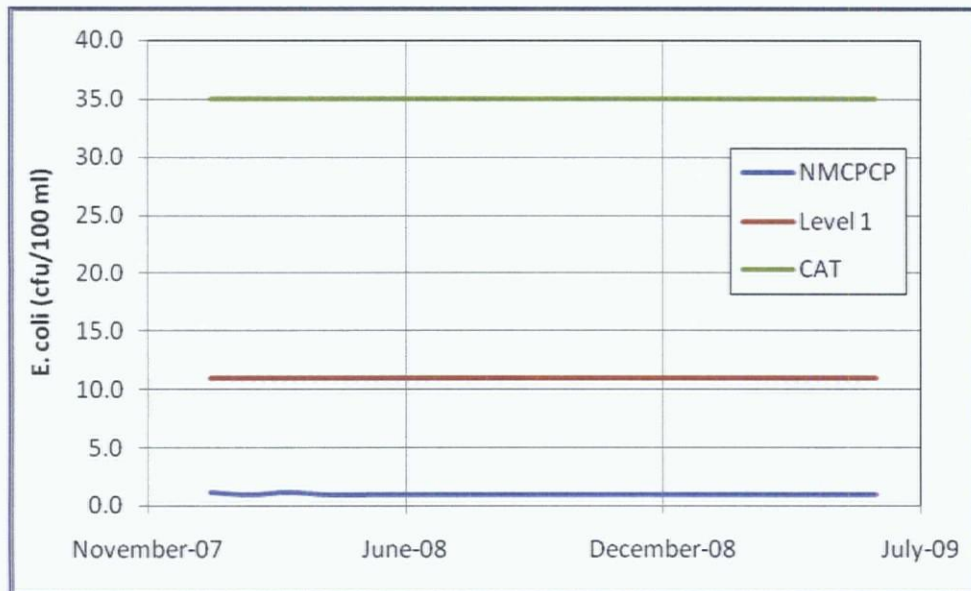


Figure 3-1
NMCCP *E. coli* Summary

3.2.2 Total Residual Chlorine

Treated effluent at the NMCCP is chlorinated with sodium hypochlorite following filtration. The chlorinated effluent is then dechlorinated using sodium bisulfate prior to discharging into Pohick Creek. Reclaimed water will be diverted to the reclaimed water pump station from the chlorine contact tank prior to dechlorination. The existing Advanced Plant Water (APW) Pump Station will be modified with additional pumps to serve as the Reclaimed Water Pump Station.

Per the Reuse Regulation, NMCCP is required to monitor for TRC prior to discharging reclaimed water into the distribution system. The regulation for Level 1 treated water sets a CAT for TRC at 1.0 mg/L following a contact period of 30 minutes at average flow or 20 minutes at peak flow. A CAT for TRC below 1.0 mg/L may be authorized if the treatment plant is demonstrated to provide comparable disinfection through a chlorine reduction program. NMCCP has demonstrated to the State Water Control Board that it can provide comparable disinfection through a chlorine reduction program in accordance with the Sewage Collection and Treatment Regulations (9VAC25-790). As a result of the chlorine reduction program, NMCCP is permitted in their VPDES to reduce their final effluent TRC to 0.5 mg/L following the contact period and prior to dechlorination at the outlet of the chlorine contact tank, see Appendix A for page 11 from the VPDES Permit Program Fact Sheet. NMCCP requests that the CAT for TRC at the point of compliance be set at the same level as their VPDES permit (0.5 mg/L) for the reclaimed water system.

NMCPCP's current VPDES permit allows no more than 36 samples per month to be below 0.5 mg/L for discharge to Pohick Creek. These allowances are not permitted for discharge to the reclaimed water distribution system. Therefore, a secondary chlorine injection point will be added downstream of the reclaimed water pump station to provide redundancy to the Plant's primary injection point. During normal operation, the primary chlorine injection point will provide the necessary chlorine dose to exceed the CAT for TRC at the new reclaimed water chlorine sampling point. A new online chlorine analyzer will measure the TRC upstream of the reclaimed water pump station. If the TRC nears the CAT upstream of the reclaimed water pump station, the secondary chlorine injection point will provide an additional chlorine dose to prevent the TRC from reaching the CAT at the point of compliance.

The secondary chlorine injection point can also be used to provide additional chlorine to the reclaimed water system during periods of low demand to inhibit biological growth within the system and insure a residual is kept throughout the system. This can be used in conjunction with hydrant flushing to assure that high quality water will be available to all customers throughout the reclaimed water distribution system. Operational procedures for increased chlorine doses and hydrant flushing during periods of low demand will be included in the systems Operation and Maintenance Manual.

Because of the physical constraints of the Plant, drawing the reclaimed water from the final pass of the existing chlorine contact tank would be difficult to construct, therefore; the required chlorine contact time for Level 1 treated water will not be achieved in the existing chlorine contact chamber. A new chlorine contact facility will be installed downstream of the reclaimed water pump station to provide the required chlorine contact time for Level 1 treatment. This new chlorine contact facility will consist of approximately 1,800 LF of 36-inch DIP which will provide 30 minutes of contact time at average daily flow and 20 minutes of contact time at 4,600 gpm (reclaimed water pump station peak flow).

Since the reclaimed water has a separate chlorine contact facility, a new TRC sampling point will be constructed to monitor TRC prior to entering the distribution system. The new chlorine sampling station will serve as the "point of compliance" for TRC. The reclaimed water distribution system will begin after this point in the system. The sampling facility will consist of a continuous on-line monitoring system with data recording and an automated alarm tied to the existing Plant SCADA system to assure that there is a minimum of 0.5 mg/L chlorine residual. If the Corrective Action Threshold (CAT) is reached for TRC, the Plant's PLC will turn off the pump at the reclaimed water pump station, thereby diverting all plant flow to Outfall 001. Additionally, should the pumps fail to shut down; the PLC will actuate a pair of valves to divert the water from the point of compliance to the head of the AWT process. Figure 3-2 shows the locations of the chlorine injection, sampling, and reject water diversion points, and Figure 3-3 shows a schematic of the NMCPCP reclamation system.

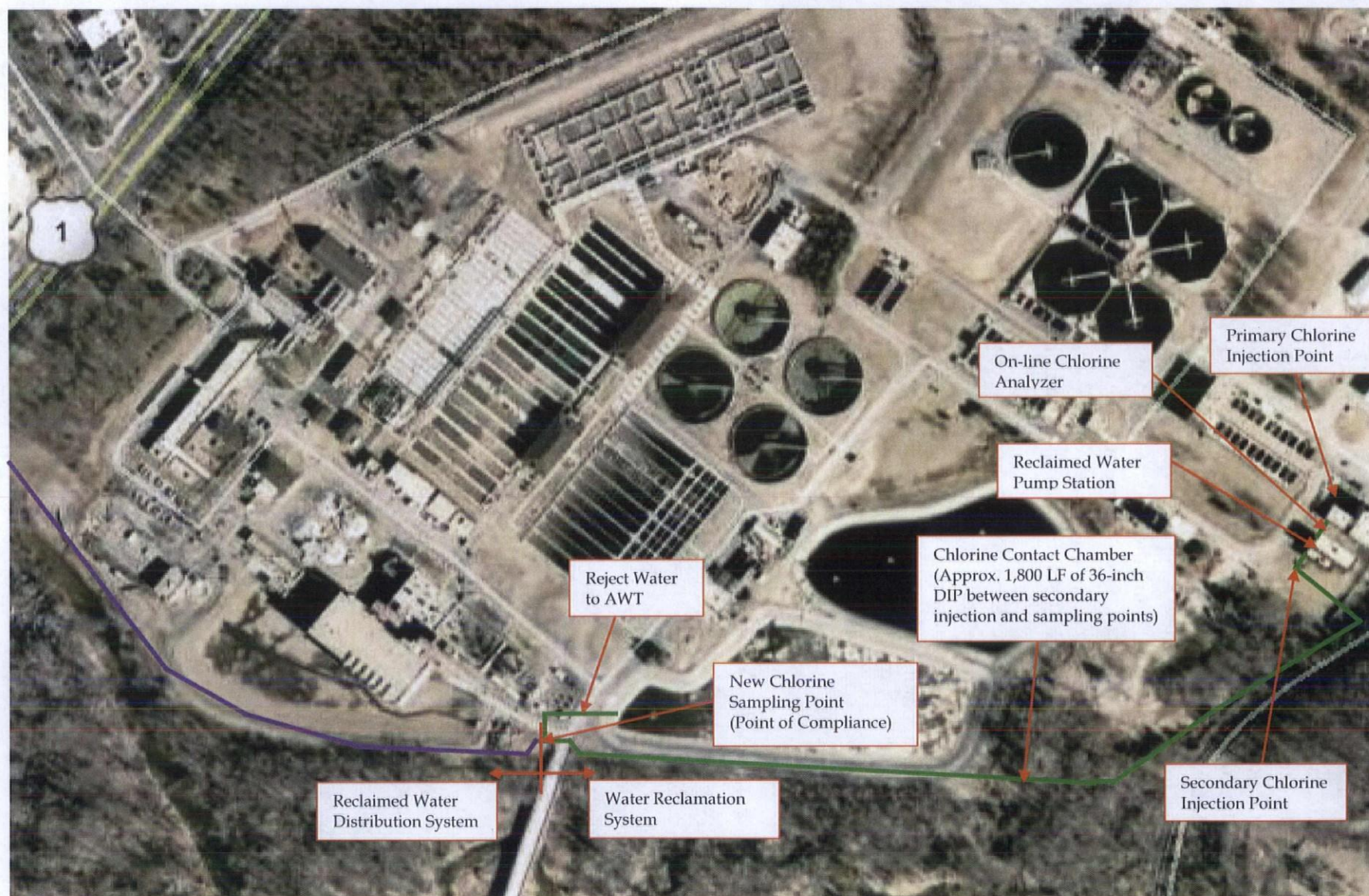
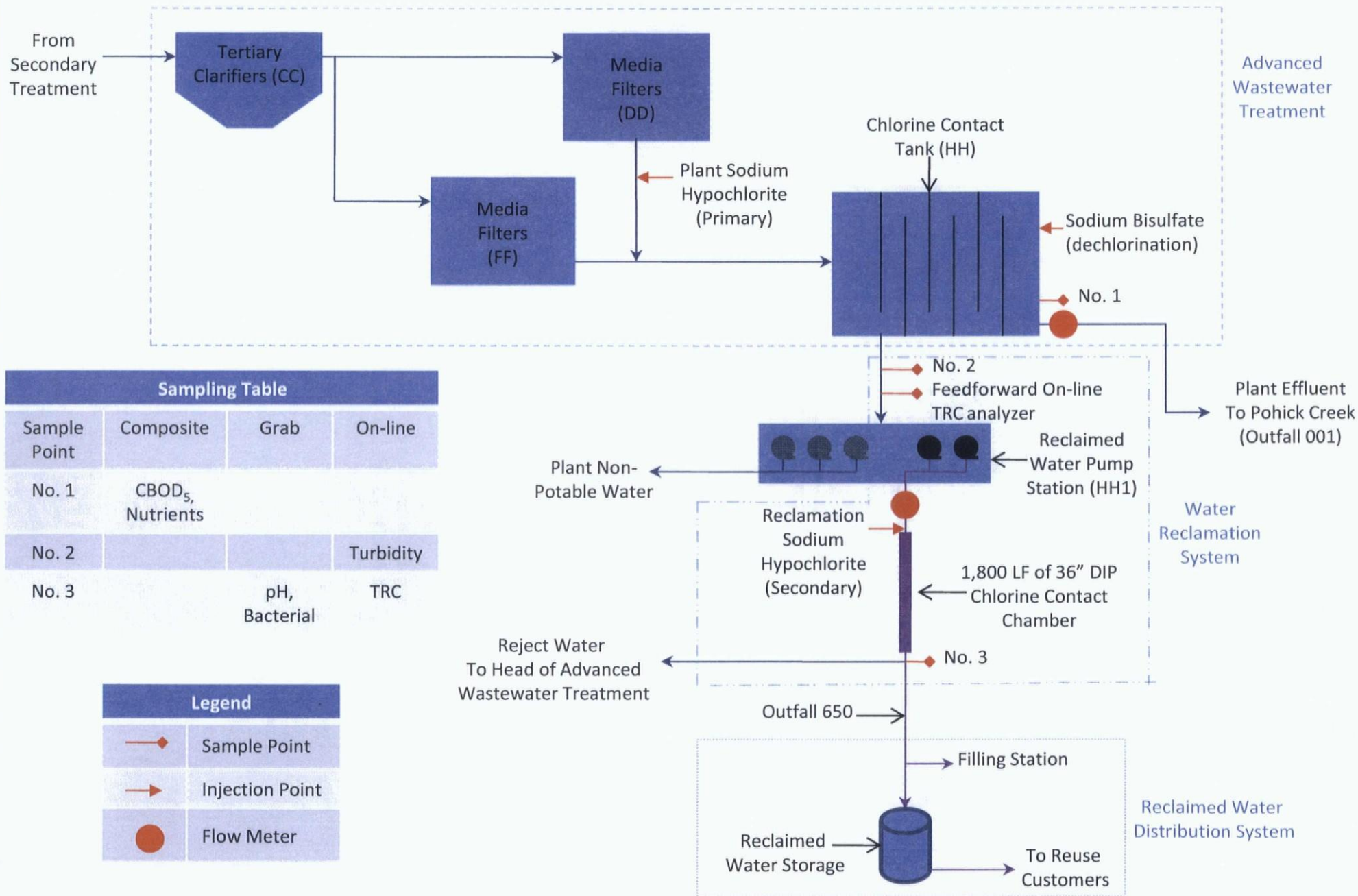


Figure 3-2
NMCCPCP Chlorine Injection and Sampling Points (Source: GoogleTM Earth Pro)



3.2.3 pH

Reclaimed water treated at the NMPCP is within the required pH concentration requirements of between 6.0 and 9.0 standard units (s.u.). As summarized in Table 3-1, current effluent data from the NMPCP shows an average of 6.8 s.u. The minimum value during the same time frame was 6.2 s.u. (January 2008), while the maximum value resulted in 7.3 s.u. (June, August, and October 2008). **Figure 3-4** is a graphical representation of the current pH sample results and the regulated minimum and maximum limits. pH will be monitored at least once per day at the new sample station (point of compliance). Compliance with the range of the pH standard is determined daily based on the pH of the samples. This meets DEQ standards for water reuse.

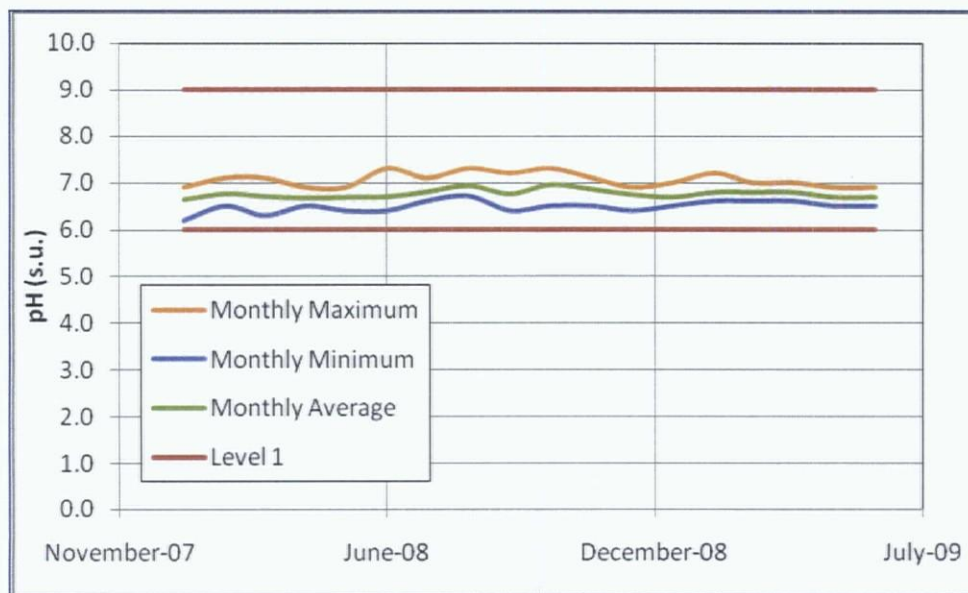


Figure 3-4
NMPCP pH Summary

3.2.4 CBOD₅

CBOD₅ levels are required to be less than or equal to 8 mg/L for Level 1 treatment for reclaimed water discharge. CBOD₅ currently is sampled at NMPCP per their current VPDES permit. The current measured CBOD₅ levels have been below the detection limit of 2.0 mg/L. Figure 3-5 summarizes the CBOD₅ data along with maximum limits.

The Reuse Regulation states that sampling must take place "at least weekly or more frequently based on the design flow of the reclamation system, and shall be the same sampling type and frequency as specified for sewage treatment works in the Sewage Collection and Treatment Regulations." In compliance with this regulation, CBOD₅ sampling occurs three days per week. Compliance with the monthly and maximum weekly average CBOD₅ standards are determined monthly, based on the arithmetic mean of all samples collected during the month. This meets DEQ standards for water reuse.

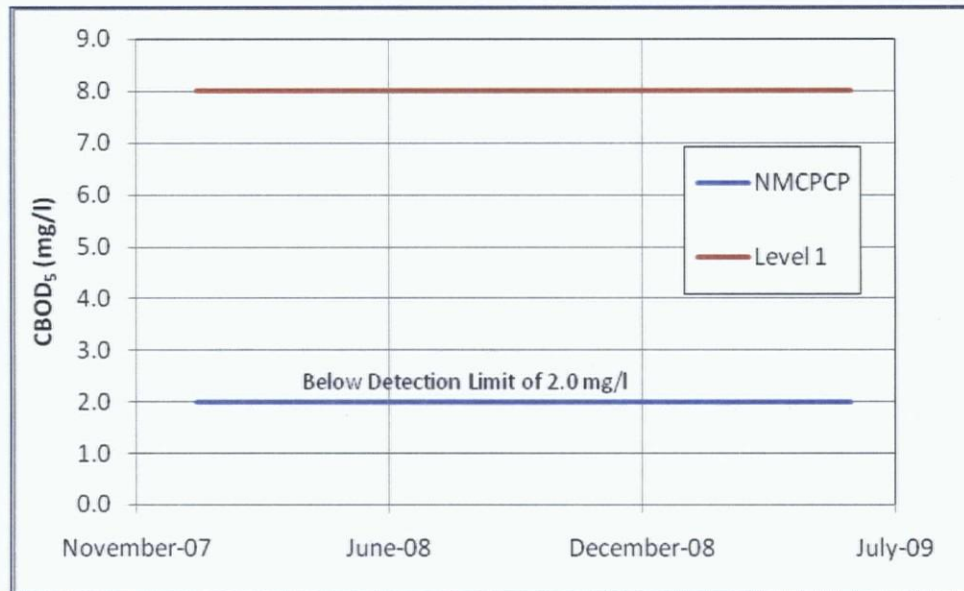


Figure 3-5
NMCCPCP CBOD₅ Summary

3.2.5 Turbidity

Daily average of discrete measurements recorded over a 24-hour period for Turbidity are required to be below 2.0 nephelometric turbidity units (NTU) for Level 1 treatment for reclaimed water discharge. Turbidity is currently measured at the NMCCPCP at the effluent of each filter train (DD and FF). The average current turbidity level from Filter DD is 0.48 and the maximum and minimum values over that time period are 1.59 and 0.20 respectively. The average, maximum, and minimum values for Filter FF are 0.65, 2.30, and 0.07 respectively. Figure 3-6 is a graphical representation of the current Turbidity sample results and the regulated maximum limits.

Turbidity will be monitored continuously upstream of the reclaimed water pump station using a new in-line turbidity meter. The point of compliance for turbidity is the new on-line turbidity meter shown in Figure 3-3. The SCADA system will notify the operator when the CAT for Level 1 is in jeopardy of being exceeded. The operator will initiate a review to identify the cause of the CAT monitoring results. Corrective action is taken at this time potentially including adjusting filter backwash.

Resampling will occur within one hour, if the water remains out of compliance the water will be diverted away from the reclaimed water distribution system to Outfall 001 until the water can be brought back into compliance. Once the water is brought back into compliance, resampling will occur within the hour to verify that the water meets Level 1 requirements.

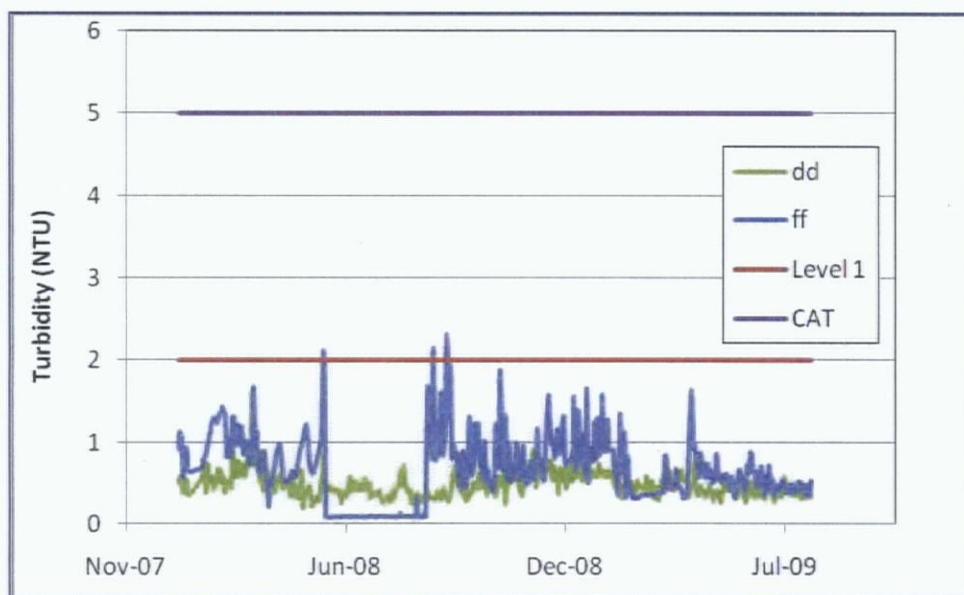


Figure 3-6
NMCCPCP Turbidity Summary (Daily Average)

3.2.6 End User Notification

Fairfax County will notify end users and the affected public of any treatment failures at the reclamation system that can adversely impact human health, or result in loss of reclaimed water service, as follows:

- Where the CAT of the reclaimed water is reached, and the reclaimed water is not brought back into compliance with Level 1 treatment in accordance with 9VAC25-740-70 within the time frame set in 9VAC25-740-70 C more than once during a seven-day period, and the non-compliant reclaimed water has been discharged to the reclaimed water distribution system, Fairfax County will notify the end user of the treatment failures and advise the end user of precautions to be taken to protect public health when using the reclaimed water in areas accessible to the public or where human contact with the reclaimed water is likely. These precautions shall be implemented for a period of seven days or greater depending on the frequency and magnitude of the treatment failure.
- Should the CAT for turbidity or TRC be reached the operator of the reclamation system shall immediately initiate a review of treatment operations and data to identify the cause of the CAT monitoring results to bring the reclaimed water back into compliance with the standards. End users will be notified and reclaimed water will be diverted away from the reclamation system within one hour of first

reaching the CAT if subsequent resampling demonstrates that the reclaimed water remains out of compliance.

- Where reclaimed water service to end users will be interrupted due to planned causes, such as scheduled repairs, Fairfax County will provide advance notice to end users of the anticipated date and duration of the interrupted service.

Where reclaimed water service to end users is disrupted by unplanned causes, such as an upset at the reclamation system, Fairfax County will notify end users and the affected public of the disrupted service if it cannot or will not be restored within eight hours of discovery.

Section 4

Implementation Strategy

4.1 Implementation Plan

The following sections describe the implementation strategy undertaken by Fairfax County to develop a public education program focused benefits of reuse, a cross connection and backflow prevention program, standards and details, and service agreements and/or customer contracts with each potential reuse customer prior to coming on-line.

The County's short-term program involves restricting access to reclaimed water for reuse to large users and not to the general public at this time. As a result, their implementation strategy will be focused on educating the users on operations and maintenance of their reuse systems. Construction oversight of the reuse facilities will be performed by the County, which allows the County to educate their employees as to the appropriate construction, cross-connection, and backflow prevention methods using the standards and details developed for this program.

4.1.1 Public Education Program

Fairfax County has begun a public education program to make the public aware of the use of reclaimed water and its benefits, precautionary handling of reclaimed water, and the need to alert and educate the public and users on those issues. Meetings and communications with stakeholders, decision makers (both internal and external to Fairfax County), potential users, and the public are necessary to ensure the success of the program. Not only is increasing public awareness of the safe handling of reuse water a goal, but gaining internal support from various branches of the County to implement the fail-safes required is important.

The County has performed presentations to members of the Board of Supervisors and their Environmental Committee, the South County Federation (a local public group), and the Fairfax County Park Authority and Health Department. Fairfax County is also answering this challenge by developing fact sheets for both internal and external use. Internal presentations will continue to be made by Fairfax County staff in support of the reuse program and its many benefits in helping to meet Fairfax County's anticipated effluent limits tightening. External fact sheets will be created for customers included pertinent facts about reuse water. Additionally, a water reuse brochure will be developed to increase the public's understanding of the quality and safety of reclaimed water, how it could be used, and the benefits of using reuse water while conserving potable water, particularly during droughts. These methods will help increase support for the Reuse Program.

The County has developed an extensive Reuse Outreach Program intended to educate both users and the general public. The following schedule will be used by the County to implement the current Reuse Program. Many of these action items are already underway.

Public Outreach Action	Proposed Date
Board of Supervisors presentation	Fall 2009
Meet with Park Authority and Health Dept	Fall 2009
Presentation to Little League	Fall 2009
Generic Tri-Fold created for general public	Fall/Winter 2009
Safety Tri-Fold	Spring 2010
Web site FAQ	Spring 2010
Posters/Signs for group presentations	Fall 2010

4.1.2 Cross Connection/Backflow Prevention Control Program

As part of the implementation of a reuse program, Fairfax County is currently developing a Cross Connection/Backflow Prevention Program (CC/BFP) specifically for its reclaimed water system to ensure its proper usage. Fairfax County currently manages the potable water backflow prevention program for Fairfax Water. This is part of an agreement with Fairfax Water to administer the program as required under the Virginia Department of Health Waterworks Regulation. To implement a reuse cross connection program, minor modifications will be made to that program as described below.

A comprehensive CC/BFP for the reclaimed water system will include a Cross Connection/Backflow Prevention Program procedures manual, cross connection diagrams, and inspection forms. The program will include procedures and standards for both Fairfax County and its contractors to follow to ensure public health and safety through the appropriate installation and inspection of the reclaimed water system.

The CC/BFP program manual will require testing and inspections to be performed for every reclaimed water user to protect public health and end Users' facilities from cross contamination. They will include, at a minimum, backflow prevention testing, pressure testing, and annual site visits. A certified plumber will perform backflow prevention testing on an annual basis and provide testing results to Fairfax County. Pressure testing will be performed on a user's reclaimed water system prior to the initial connection to Fairfax County's reclaimed water distribution system, after any modification to a user's reclaimed water system, and on a periodic basis (not to exceed 4 years between pressure testings). The annual site visits will verify the user is operating their reclaimed water system in accordance with 9VAC25-740 and the User's Service Agreement.

A copy of the program is available as Appendix B.

4.1.3 Standards and Details

Fairfax County developed Reuse Water Standards and Details to meet the equipment standards, assure quality workmanship, and meet the recently developed State requirements (spacing, signage, etc.). Based from Fairfax County's *Public Facilities*

Manual, these standards and details will ensure public health and safety through the proper installation of appropriate equipment for the reclaimed water system. These standards will be used by engineers and contractors in Fairfax County during design and construction of water reuse facilities and distribution systems within the Water Reuse Service Area. The constructed facilities will be owned and operated by Fairfax County up to the meter, and it is critical that the materials and quality of construction meet those defined Fairfax County standards prior to acquisition and use. Similar to water standards, these documents include minimum materials of construction, valves, pipes, testing requirements, and set the standards for construction that will sustain Fairfax County for years to come.

4.1.4 Service Agreements

Per 9VAC25-740-40 C, Fairfax County is responsible for the monitoring and management of individual end users with a service connection for reclaimed water and will have service agreements between Fairfax County and these individual end users.

Fairfax County has developed a Water Reuse Service Agreement Template to be used for all new customers. This agreement benefits Fairfax County by protecting their rights, promoting long-term use, and confirming the commitment from the user. It also protects the rights of the User since the use of this reclaimed water will become an integral part of business operations. Included as Appendix C, this template Agreement meets the needs of both Fairfax County and the users by being flexible enough to be used by various Users, yet includes all the requirements needed by Fairfax County to secure reuse well into the future. This template also includes additional requirements for irrigation water and process water in its appendix. These requirements are more site specific than the general requirements located in the Service Agreement and can be modified depending on the intended reuse activities.

In addition to a Water Reuse Service Agreement Template, Fairfax County has developed a Filling Station Service Agreement Template to use for customers to fill tank trucks with reclaimed water at a designated filling station. The Filling Station Agreement does not promote long-term use in the same manner the Reuse Agreement Template does, however, it does provide easy access for customers to come and pick up reclaimed water for approved reuse activities. The filling station will provide reclaimed water for construction and irrigation reuse while helping to promote Fairfax County's reuse system. The filling station will be an integral tool in selling the benefits of reclaimed water to potential new customers as the reuse system grows. The agreement is included in Appendix D.

4.1.5 Bulk Irrigation Users

The majority of anticipated users will be Bulk Irrigation Users (irrigation area greater than 5 acres). These users will comply with the requirements laid out in 9VAC25-740-170 and presented below:

1. For all irrigation reuses of reclaimed water, the following shall be required:
 - There shall be no application of reclaimed water to the ground when it is saturated, frozen, or covered with ice or snow, and during periods of rainfall.
 - The chosen method of irrigation shall minimize human contact with the reclaimed water.
 - Reclaimed water shall be prevented from coming into contact with drinking fountains, water coolers, or eating surfaces.
2. For bulk irrigation reuse of reclaimed water, the following shall be required:
 - Irrigation systems shall be designed, installed and adjusted to:
 - Provide uniform distribution of the reclaimed water of the irrigation site,
 - Prevent ponding or pooling of reclaimed water at the irrigation site,
 - Facilitate maintenance and harvesting of irrigated areas and precludes damage to the irrigation system from the use of maintenance or harvesting equipment,
 - Prevent aerosol carry-over from the irrigation site to areas beyond the setback distances and,
 - Prevent clogging from algae or suspended solids.
 - All pipes, pumps, valve boxes, and outlets of the irrigation system shall be designed, installed, and identified in accordance with 9VAC25-740-110 B.
 - Any reclaimed water runoff shall be confined to the irrigation reuse site unless authorized by the board.
3. Overspray of surface waters, including wetlands, from irrigation or other reuses of reclaimed water is prohibited.
4. Setback distances for irrigation reuses of reclaimed water.
 - For sites irrigated with reclaimed water treated to Level 1, the following setback distances are required:

• Potable water supply wells and springs, and public water supply intakes	100 ft
• Non-potable water supply wells	10 ft
• Limestone rock outcrops and sinkholes	50 ft

- For sites irrigated with reclaimed water treated to Level 1, no setback distances are required from occupied dwellings and outdoor eating, drinking and bathing facilities. However, aerosol formation shall be minimized within 100 feet of occupied dwellings and outdoor eating, drinking and bathing facilities through the use of low trajectory nozzles for spray irrigation, above-ground drip irrigation, or other means.
- For irrigation reuses where more than one setback distance may apply, the greater setback distance shall govern.
- Unless specifically stated otherwise, all setback distances shall be measured horizontally.

In addition to the irrigation requirements stated above Fairfax County will provide Best Management Practices for Irrigation with Reclaimed Water to all bulk irrigation users. This is provided in Appendix E.

Bulk Irrigation Users are required to provide a site plan per 9VAC25-740-100 C.6. The site plan shall include the following:

- The boundaries of the irrigation site;
- The location of all potable and non-potable water supply wells and springs, public water supply intakes, occupied dwellings, property lines, areas accessible to the public, outdoor eating, drinking and bathing facilities; surface waters, including wetlands; limestone rock outcrops and sinkholes within 250 feet of the irrigation sites; and
- Setbacks areas around the irrigation site.

Site plans for the two anchor customers (Fairfax County Park Authority and Lower Potomac Park) that plan on using reclaimed water for bulk irrigation are provided in Appendix F. Bulk irrigation users that apply for reclaimed water permits after this RWM plan will provide site plans in Exhibit A of the user agreement (Appendix C). These site plans will be provided to the State Water Control Board with the user agreement as an amendment to this RWM plan.

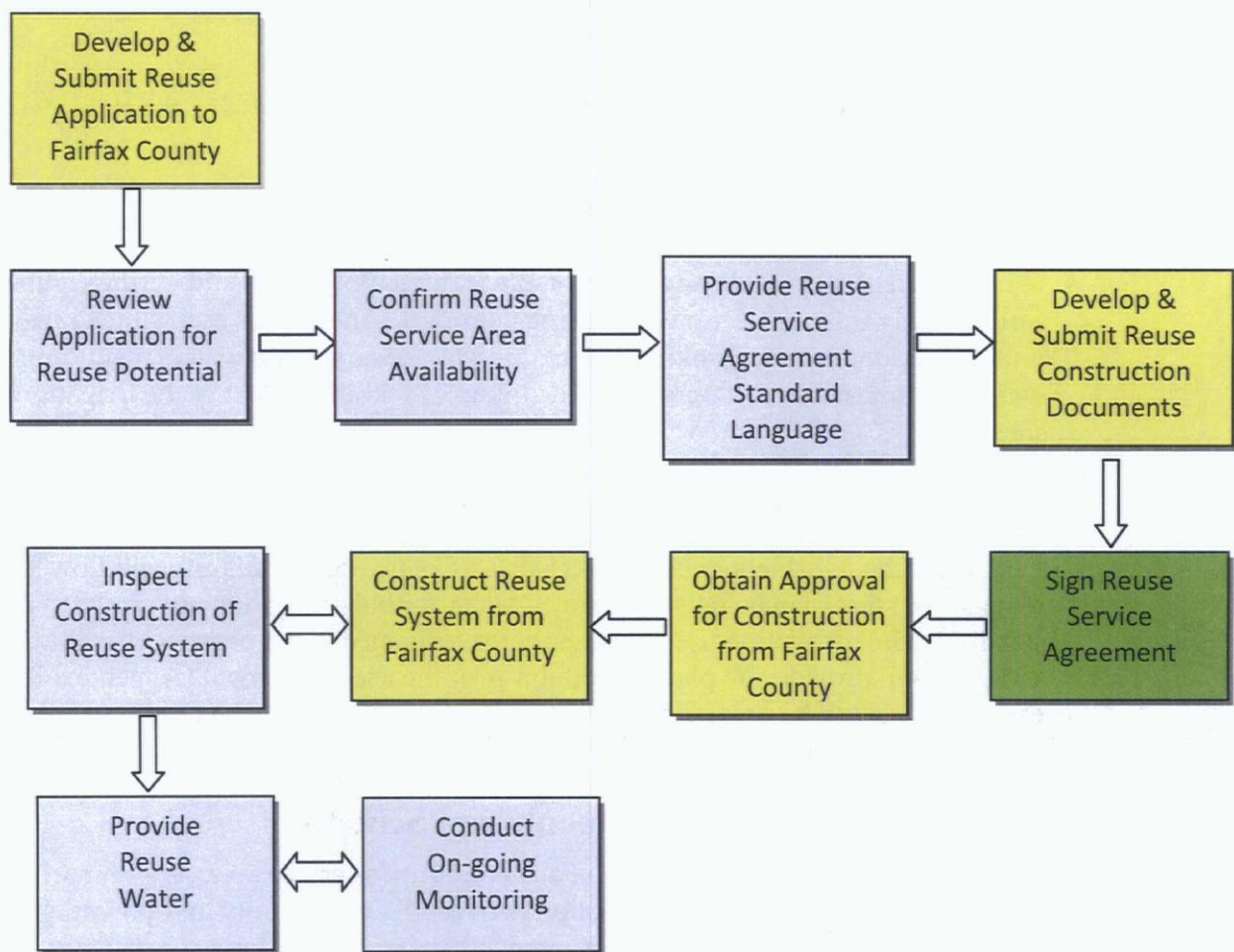
4.1.6 Reuse Customer Implementation Schedule

Implementing a reuse program within Fairfax County's service area, as summarized on Figure 4-1, begins with communication between Fairfax County and potential Users. Potential reuse customers will approach Fairfax County for a construction permit review. Once Fairfax County receives the construction permit documentation, they will review the potential for reuse at the particular site based on amount of reuse desired by the customer, location of the potential reuse site, and feasibility of transferring reuse to the site. If potential is identified, the reuse service area map will be checked for availability. Once it is determined that reuse is a viable option for the potential user, rate discussions will occur. Fairfax County will present the potential

User with typical reuse rates to determine a practical rate. Fairfax County will also provide the potential user with backflow prevention information, standards and details, and a typical service agreement. With this information, the potential User will develop and issue the reuse documents to Fairfax County for approval.

Following approval of the reuse customer, the reuse system is constructed in conjunction with inspection by Fairfax County. Fairfax County and the reuse User sign the service agreement, outlining all requirements. Per the Reuse regulations, once the system is constructed and reuse water is transferred to the reuse customer (the user), Fairfax County monitors the system, as described in Section 3 of this report.

Figure 4-1
Overview of Reuse Customer Implementation Process



Notes:

- Activity performed by potential reuse User.
- Activity performed by Fairfax County.
- Activity performed by both potential reuse User and Fairfax County.

Appendix A

Reduced Chlorine Residual Documentation from the VPDES Permit Program Fact Sheet

19. Sludge Monitoring and Limitations**A. Regulations:**

The VPDES Permit Regulation (VAC 25-31-10 et seq.), has incorporated technical standards for the use or disposal of sewage sludge, specifically land application and surface disposal, promulgated under 40 CFR Part 503.

The Permit Regulation (9 VAC 25-31-420) establishes the standards for the use or disposal of sewage sludge. This part establishes standards, which consist of general requirements, pollutant limits, management practices, and operational standards, for the final use or disposal of sewage sludge generated during the treatment of domestic sewage in the treatment works.

B. Evaluations:**Sludge Classification:**

The Noman M. Cole PCP is considered as Class I sludge management facility. The permit regulation (9 VAC 25-31-500) defines a Class I sludge management facility as any POTW which is required to have an approved pretreatment program defined under Part VII of the VPDES Permit Regulation (9 VAC 25-31-730 to 900) and/or any treatment works treating domestic sewage sludge that has been classified as a Class I facility by the Board because of the potential for its sewage sludge use or disposal practice to adversely affect public health and the environment. The Noman M. Cole PCP incinerates the sludge generated from the wastewater treatment process. Incineration is governed by the regulations of the Air Pollution Control Board. The ash generated from the incinerators is disposed in a landfill.

- 20. Antibacksliding:** There are no changes proposed to the limits for this permit reissuance from those established with the previous permit. Therefore, there are no backsliding issues to address in the proposed permit.

21. Other Permit Requirements :

- a) Part 1.B. of the permit contains additional chlorine monitoring requirements, quantification levels and compliance reporting instructions.

In accordance with VDH's Disinfection Guidelines and Requirements, a minimum chlorine residual must be maintained at the exit of the chlorine contact tank. As stated in VA-VDH's January 6, 1997 Working Memo from C.M.Sawyer, P.E., no more than 10% of the monthly test results for TRC at the exit of the chlorine contact tank shall be <1.0 mg/L with any TRC <0.6 mg/L considered a system failure. Variance from these requirements are allowed where the discharger provides adequate indicator microorganism test results for the effluent that verify disinfection standards were met during the TRC violations. *E. coli* limits are defined in this section as well as monitoring requirements to take effect should an alternate means of disinfection be used. Noman M. Cole PCP has been allowed a minimum chlorine contact value of 0.5 mg/L since the fecal coliform values have demonstrated that disinfection standards were met.

9 VAC 25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9 VAC 25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

A vertical dashed line consisting of 20 short, thick black horizontal bars spaced evenly along the left margin of the page.

Appendix B

Cross Connection / Backflow Prevention Program

Fairfax County Reclaimed and Reuse Program

Cross-connection Control/Backflow Prevention Program Manual



Quality of Water = Quality of Life



Fairfax County

Cross-connection Control/Backflow Prevention Program Manual

Contents

1.	Introduction	1
1.1	Purpose	1
1.2	Causes of Backflow	1
1.2.1	Backsiphonage	1
1.2.2	Backpressure	2
1.3	Responsibilities	2
1.3.1	Reclaimed Water Purveyor (Fairfax County)	2
1.3.2	User (Existing and New)	2
1.4	Laws and Regulations	2
2.	Definitions	3
3.	Requirements	6
3.1	System Description	6
3.1.1	Reclaimed Water System	6
3.1.1.1	Reclaimed Water Source	6
3.1.1.2	Reclaimed Water Distribution System	6
3.1.1.3	End Users	6
3.1.2	Potable Water System	6
3.1.2.1	Cross-connections with Reclaimed Water	6
3.2	Policy	6
3.2.1	Description of Hazards	7
3.2.2	Backflow Protection Requirements	7
3.2.3	Existing Backflow Preventers	9
3.2.4	Plan Review Process	9
3.2.5	Inspection and Testing	9
3.2.6	Record Keeping	10
3.2.7	Enforcement and Penalties	10

Appendices

Appendix A – Standard Details

Appendix B – Backflow Prevention Field Test Report

1. Introduction

Fairfax County's Reclaimed and Reuse Program provides high quality treated municipal wastewater for approved reuse via the County's reclaimed water distribution system. The County's Reclaimed and Reuse Program reduces the demand on the potable water supply allowing for future growth and improves water quality by reducing nutrient loading to Pohick Creek, a tributary of the Potomac River. As part of the Virginia Water Works Regulations "Water Reclamation and Reuse Regulation" (9VAC25-740) a Cross-connection Control/Backflow Prevention Program Manual is required for the Reclaimed and Reuse Program. This manual provides the rules, regulations, specifications and procedures necessary to administer the program and facilitate compliance of all Federal and State laws, statutes and regulations.

1.1. The Purpose of this Manual is to:

- Evaluate the potential for cross-connections of the reclaimed water distribution system to a potable water system and backflow to the reclaimed water distribution system from industrial end users;
- Evaluate the public health risks associated with possible backflow from industrial end users,
- Describe inspections to be performed by the applicant or permittee at the time end users connect to the reclaimed water distribution system and periodically thereafter to prevent cross-connections to a potable water system and backflow from industrial end users as determined necessary through the program evaluation, and
- Insure that cross-connection and backflow prevention design criteria specified in 9VAC25-740-110 B for reclaimed water distribution systems are implemented.

1.2. Causes of Backflow

Where cross-connections within a potable/reclaimed water system exist backflow can occur. There are two forms of backflow: backsiphonage and backpressure. Backflow cannot be totally eliminated, as it is normally caused by accident or unexpected circumstances. However, most causes of backflow can be controlled by good design, proper protection and professional maintenance. Given below, are discussions of the two causes of backflow.

1.2.1. Backsiphonage is the result of reduced or negative pressure in the potable/reclaimed water supply pipe. The principal causes of backsiphonage are:

- Water line repair or break, which is at a lower elevation, creates a negative pressure when water in the line flows to the lower point in the system.
- Undersized piping. When water is withdrawn from a pipe at a very high velocity, the pressure in the pipe is reduced. The pressure differential can cause contaminated water to flow into the pipe thru a siphoning effect.
- Reduced pressure in the reclaimed water system infrastructure due to high water withdrawal rate such as fire flow, water main flushing, mainline water system breaks, or peak system use.

- Reduced supply main pressure on suction side of a booster pump.

1.2.2. Back Pressure may occur where a potable/reclaimed water system is cross connected to another system of piping, and the pressure in the other system exceeds that of the potable/reclaimed system. The principal causes of back pressure are:

- Booster pump system designed without backflow prevention devices.
- Reclaimed water connections to boilers and other pressure systems without backflow prevention devices.
- Connections with another system that may, at times, have a higher pressure.
- Water stored in tanks or plumbing systems, which due to their higher elevations, would create pressure sufficient to cause backflow if pressure were lowered in the County's reclaimed water system.
- Incorrect new construction, or existing system refit, that unintentionally creates a potential cross-connection scenario.

1.3. Responsibilities

1.3.1. Reclaimed Water Purveyor (Fairfax County)

Fairfax County shall be responsible for the protection of the public potable/reclaimed water distribution systems from contamination or pollution due to the backflow of contaminants or pollutants through the water service connection. If, in the judgment of Fairfax County an approved backflow-prevention assembly is required (at the customer's reclaimed water service connection; or, within the customer's private water system) for the safety of the potable/reclaimed water system, Fairfax County shall give notice in writing to said customer to install such an approved backflow-prevention assembly(s) at specific location(s) on their premises.

1.3.2. User (Existing and New)

The customer shall immediately install such approved assembly(s) at their own expense; and, failure, refusal, or inability on the part of the customer to install, have tested, and maintain said assembly(s) shall constitute grounds for discontinuing reclaimed water service to the premises until such requirements have been satisfactorily met.

1.4. Laws and Regulations

The Virginia Department of Health Waterworks Regulations "Cross-connection Control and Backflow prevention in Waterworks" (12VAC5-590-580) requires each owner of a waterworks establish and enforce a program of cross-connection control and backflow prevention.

The Virginia Water Works Regulations "Water Reclamation and Reuse Regulation" (9VAC25-740) requires a Cross-connection Control and Backflow Prevention Program Manual as part of the application process for a Reclaimed and Reuse Program.

The International Plumbing Code (IPC) provides minimum regulations for the protection of potable water supply and the selection of backflow prevention devices. The IPC is referenced by the Virginia Plumbing Code which is enforced by Fairfax County.

The Waterworks regulations require an inspection program in accordance with the Uniform Statewide Building Code-Maintenance Code. This states that inspection shall be made of all backflow prevention assemblies and air gaps to determine whether they are operable at the time of installation, immediately after repairs or relocation, and at least once annually.

AWWA M14 and the EPA Cross-Connection Control Manual provide guidance to water purveyors on the recommended procedures and practices for operating a cross-connection control program.

2. Definitions

- **Approved**
Accepted by the County responsible as meeting an applicable specification stated or cited in this ordinance or as suitable for the proposed use.
- **Backflow**
The undesirable reversal of flow in a potable/reclaimed water distribution system as a result of a cross-connection.
 - **Backpressure**
A pressure, higher than the supply pressure, caused by a pump, elevated tank, boiler, or any other means that may cause backflow.
 - **Backsiphonage**
Backflow caused by negative or reduced pressure in the supply piping.
- **Backflow Preventer**
An assembly or means designed to prevent backflow.
 - **Air gap.**
The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet conveying water or waste to a tank, plumbing fixture, receptor, or other assembly and the flood level rim of the receptacle.
 - **Reduced-pressure backflow-prevention assembly.**
The approved reduced-pressure principle backflow-prevention assembly consists of two independently acting approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and below the first check valve. These units are located between two tightly closing resilient-seated shutoff valves as an assembly and equipped with properly located resilient-seated test cocks.
 - **Double check valve backflow-prevention assembly.**
The approved double check valve backflow-prevention assembly consists of two internally loaded check valves, either spring-loaded or internally weighted,

installed as a unit between two tightly closing resilient-seated shutoff valves and fittings with properly located resilient-seated test cocks.

- **Dual check valve**

The approved dual check valve shall contain two internally loaded, independently operating check valves.

- **Contamination**

An impairment of a potable/reclaimed water supply by the introduction or admission of any foreign substance that degrades the quality and creates a health hazard.

- **Cross-Connection**

A connection or potential connection between any part of a potable/reclaimed water system and any other environment containing other substances in a manner that, under any circumstances would allow such substances to enter the potable water system / reclaimed water system. Other substances may be gases, liquids, or solids, such as chemicals, waste products, steam, water from other sources (*potable or nonpotable*), or any matter that may change the color or add odor to the water.

- **Cross-Connection – Controlled**

A connection between a potable/reclaimed water system and a nonpotable water system with an approved backflow-prevention assembly properly installed and maintained so that it will continuously afford the protection commensurate with the degree of hazard.

- **Cross-Connection Control by Containment**

The installation of an approved backflow prevention assembly at the potable/reclaimed water service connection to any customer's premises, where it is physically and economically unfeasible to find and permanently eliminate or control all actual or potential cross-connections within the customer's water system; or it shall mean the installation of an approved backflow prevention assembly on the service line leading to and supplying a portion of a customer's potable/reclaimed water system where there are actual or potential cross-connections that cannot be effectively eliminated or controlled at the point of the cross-connection.

- **Hazard, Degree of**

The term is derived from an evaluation of the potential risk to public health and the adverse effect of the hazard upon the potable/reclaimed water system.

- **Hazard – health.**

A cross-connection or potential cross-connection involving any substance that could, if introduced into the potable/reclaimed water supply, cause death or illness, spread disease, or have a high probability of causing such effects.

- **Hazard – plumbing.**

A plumbing-type cross-connection in a consumer's potable/reclaimed water system that has not been properly protected by an approved air gap or an approved backflow-prevention assembly.

- **Hazard – non-health.**

A cross-connection or potential cross-connection involving any substance that generally would not be a health hazard but would constitute a nuisance or be aesthetically objectionable, if introduced into the potable/reclaimed water supply.

- **Hazard – system.**

An actual or potential threat of severe damage to the physical properties of the potable/reclaimed water supply or the consumer's potable/reclaimed water system or of a pollution or contamination that would have a protracted effect on the quality of the potable/reclaimed water in the system.

- **Industrial-Fluids System**

Any system containing a fluid or solution that may be chemically, biologically, or otherwise contaminated or polluted in a form or concentration, such as would constitute a health, system, pollution, or plumbing hazard, if introduced into an approved water supply. This may include, but not be limited to, polluted or contaminated waters; all types of process waters and used waters originating from the potable/reclaimed water system that may have deteriorated in sanitary quality; chemicals in fluid form; plating acids and alkalis; circulating cooling waters connected to an open cooling tower; and/or cooling towers that are chemically or biologically treated or stabilized with toxic substances; contaminated natural waters, such as wells, springs, streams, rivers, bays, harbors, seas, irrigation canals or systems, and so forth; oils, gases, glycerin, paraffins, caustic and acid solutions, and other liquid and gaseous fluids used in industrial or other purposes for fire-fighting purposes.

- **Pollution**

The presence of any foreign substance in water that tends to degrade its quality so as to constitute a non-health hazard or impair the usefulness of the water.

- **Service Connection**

The terminal end of a service connection from the potable/reclaimed water system, that is, where the water purveyor loses jurisdiction and sanitary control over the water at its point of delivery to the customer's potable/reclaimed water system. If a meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the meter. There should be no unprotected takeoffs from the service line ahead of any meter or backflow-prevention assembly located at the point of delivery to the customer's water system. Service connection shall also include water service connection from a fire hydrant and all other temporary or emergency water service connections from the public potable/reclaimed water system.

- **Water – Potable**

Water that is safe for human consumption as described by the public health authority having jurisdiction.

- **Water – Nonpotable**

Water that is not safe for human consumption or that is of questionable quality.

- **Water – Reclaimed**

Water resulting from the treatment of domestic, municipal, or industrial wastewater that is suitable for a water reuse that would not otherwise occur.

- **Water – Used**

Any water supplied by a water purveyor from a potable/reclaimed water system to a consumer's potable/reclaimed water system after it has passed through the point of delivery and is no longer under the sanitary control of the water purveyor.

3. Requirements

3.1. Systems Description

Fairfax County owns and maintains the water reclamation facility and the reclaimed water distribution system as well as enforces the provisions of the Virginia State Waterworks Regulation and Virginia Statewide Building Code on backflow requirements and testing on Fairfax Water's potable water distribution system. The Fairfax County Department of Public Works and Environmental Services currently administers the requirements of The Virginia Department of Health Waterworks Regulations "Cross-connection Control and Backflow prevention in Waterworks" (12VAC5-590-580) for both the potable and the reclaimed water distribution systems.

3.1.1. Reclaimed Water System

3.1.1.1. Reclaimed Water Source

The Noman M. Cole Jr. Pollution Control Plant (NMCPCP) produces high quality effluent that is used as a source for reclaimed water by Fairfax County.

3.1.1.2. Reclaimed Water Distribution System

Fairfax County owns and maintains a system of reclaimed water pipes and storage tanks that serve reclaimed water users. The County's system extends to the users reclaimed water meter.

3.1.1.3. End Users

Customers who have been approved by Fairfax County and have signed a Reclaimed Water Service Agreement with the County are permitted to utilize reclaimed water for approved reuse in accordance with 9VAC25-740. The end users system starts at the reclaimed water meter.

3.1.2. Potable Water System

3.1.2.1. Cross-connections with Reclaimed Water

Potable water is provided within Fairfax County by Fairfax Water. Potable water may be used to supplement reclaimed water for a reuse, provided there is an air gap separation of at least eight inches between the potable water system and the reclaimed water system or a reduced pressure principle backflow prevention device installed at the potable water service connection to the reuse system.

3.2. Policy

No reclaimed water service connection to any premises shall be installed or maintained by Fairfax County unless the potable/reclaimed water supply is protected.

3.2.1. Description of Hazards

The County recognizes the threat to the public potable/reclaimed water system arising from cross-connections. All threats will be classified by degree of hazard and will require the installation of approved air gaps, reduced-pressure principle backflow-prevention devices, or double check valve backflow-prevention assembly.

Premises with one or more of the following conditions shall be classified as follows:

High Hazard	The contaminant would be toxic, poisonous, noxious, or unhealthy.
	A health hazard would exist.
	A high probability exists of a backflow occurrence either by back pressure or by back siphonage.
	The contaminant would disrupt the service of piped water for drinking or domestic use.
	Examples – sewage, used water, non potable water, auxiliary water systems, toxic or hazardous chemicals.
Moderate Hazard	The contaminant would only degrade the quality of the water aesthetically or impair the usefulness of the water.
	A health hazard would not exist.
	A moderate probability exists of a backflow occurrence either by back pressure or by back siphonage.
	The contaminant would not seriously disrupt the service of piped water for drinking or domestic use.
	Examples – food stuff, nontoxic chemicals, nonhazardous chemicals, etc.
Low Hazard	The contaminant would only degrade the quality of the water aesthetically.
	A health hazard would not exist.
	A low probability exists of a backflow occurrence primarily by back siphonage.
	The contaminant would not disrupt service of piped water.
	Examples – food stuff, nontoxic chemicals, nonhazardous chemicals, etc.

In the case of any premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete in-plant cross-connection survey, the premise shall be classified as high hazard.

3.2.2. Backflow Protection Requirements

There shall be no direct cross-connections between the reclaimed water distribution system and the potable water distribution system.

An approved backflow prevention device shall be installed at each service connection to a consumer's potable/reclaimed water system where whenever the following conditions exist:

- In the case of premises having a cross-connection between a reclaimed water supply and potable water system the potable water supply shall be protected against backflow from the reclaimed water system by installing an approved backflow-prevention assembly in the potable water service line, appropriate to the degree of hazard.
- In the case of premises on which any industrial fluids or any other objectionable substances are handled in such a fashion as to create an actual or potential hazard to the reclaimed water system, the reclaimed system shall be protected against backflow from the premises by installing an approved backflow-prevention assembly in the reclaimed water service line, appropriate to the degree of hazard. This shall include the handling of process waters and waters originating from the utility system that have been subject to deterioration in quality.
- In the case of premises having (1) internal cross-connections that cannot be permanently corrected and controlled, or (2) intricate plumbing and piping arrangements or where entry to all portions of the premises is not readily accessible for inspection purposes, making it impracticable or impossible to ascertain whether or not dangerous cross-connections exist, the reclaimed water system shall be protected against backflow from the premises by installing an approved backflow-prevention assembly in the reclaimed water service line appropriate to the degree of hazard.

When, as a matter of practicality, the backflow prevention device cannot be installed at the service connection, the device may be located downstream of the service connection but prior to any unprotected takeoffs.

All air gaps shall comply with ASME A112.1.2 - Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors). Air gaps provide the highest degree of protection and shall be used whenever practical to do so in high hazard situations subject to back pressure.

All reduced-pressure principle backflow-prevention assemblies shall conform to AWWA C511 - Standard for Reduced-Pressure Principle Backflow-Prevention Assembly. A reduced pressure principal backflow prevention assembly will protect against back pressure when operating properly and shall be used if air gaps are not practical for high hazard situations and moderate hazard situations.

All double check valve backflow-prevention assemblies shall conform to AWWA C510 - Standard for Double Check Valve Backflow-Prevention Assembly. A double check valve backflow-prevention assembly shall only be used in low hazard situations.

A dual check valve shall only be used in low hazard situations.

3.2.3.Existing Backflow Preventers

All presently installed backflow-prevention assemblies that do not meet the requirements of this section but were approved assemblies for the purpose described herein at the time of installation and that have been properly maintained, shall, except for the inspection and testing requirements be excluded from the requirements of these rules so long as Fairfax County is assured that they will satisfactorily protect the reclaimed water system. Whenever the existing assembly is moved from the present location, requires more than minimum maintenance, or when Fairfax County finds that the maintenance constitutes a hazard to health, the unit shall be replaced by an approved backflow-prevention assembly meeting the requirements of this section.

3.2.4.Plan Review Process

As part of the application process for a Reclaimed Water Service Agreement, the user will provide Fairfax County all plans and specifications of the reclaimed water system during the plan review process. If, in the opinion of Fairfax County, a cross-connection or the potential for a cross-connection will exist, Fairfax County will determine the degree of hazard resulting from the cross-connection or potential cross-connection. It shall be the duty of the user to install a backflow prevention assembly appropriate to the degree of hazard.

3.2.5.Inspection and Testing

Inspections and testing shall be completed in accordance with the Virginia Uniform Statewide Building Code.

It shall be the duty of the user at any premises where backflow prevention assemblies are installed to have certified inspections and operational tests made at the time of installation, immediately after repairs or relocation, and at least once per calendar year. In those instances where Fairfax County deems the hazard to be great enough, certified inspections may be required at more frequent intervals. These inspections and tests shall be at the expense of the reclaimed water user and shall be performed by the assembly manufacturer's representative, Fairfax County personnel, or by a certified tester approved by Fairfax County. It shall be the duty of Fairfax County to see that these tests are made in a timely manner. These assemblies shall be repaired, overhauled, or replaced at the expense of the user whenever said assemblies are found to be defective.

Pressure Testing shall be conducted by Fairfax County on all premises where reclaimed water service is provided after the connection to Fairfax County's reclaimed water distribution system, immediately after alterations to the end users reclaimed water system, and at least once every four calendar years.

Pressure testing shall be accomplished by first depressurizing the reclaimed water system while maintaining pressure in the potable water system. All reclaimed water

outlets are checked to verify service has been discontinued. If any reclaimed water outlet still has service a cross connection exists and must be corrected prior to continuation of pressure testing. Once all cross connections are corrected pressure testing must be resumed. If no reclaimed water outlet has service the end users reclaimed water system is pressurized and the potable water system is depressurized. All potable water outlets are then checked to verify service has been discontinued. If any potable water outlets still has service a cross connection exists and must be corrected prior to continuation of pressure testing. If a cross connection is discovered in the potable water system after the end users reclaimed water system has been connected to Fairfax County's reclaimed water system the end users potable water system must be disinfected in accordance with the State of Virginia Plumbing Code Section 610 - Disinfection of Potable Water System. Once all cross connections are corrected and the end user's potable system is properly disinfected pressure testing must be resumed.

Site visits shall be conducted on an annual basis by Fairfax County to all end users facilities. The purpose of these site visits shall be to verify the end users reclaimed water system is operating in accordance with 9VAC25-740 and their service agreement. The site visit shall include at a minimum a visual inspection of all reclaimed water outlets and all reclaimed water piping.

3.2.6. Record Keeping

Records of all inspections, tests, repairs, and overhaul shall be kept for a minimum of 10 years and made available to Fairfax County upon request.

In addition to inspection, testing, repairs, and overhaul records the user shall keep the Reclaimed Water Service Agreement and Operation and Maintenance Manuals for all installed backflow prevention assemblies on site.

3.2.7. Enforcement and Penalties

Service of reclaimed water to any premises shall be discontinued by Fairfax County if a backflow prevention assembly required by this manual is not installed, tested, and maintained, or if a backflow-prevention assembly fails an inspection or test, or if it is found that a backflow prevention assembly has been removed or bypassed, or if an unprotected cross-connection exists on the premises. Service will not be restored until such conditions or defects are corrected at the user's expense.

Appendix A - Standard Details

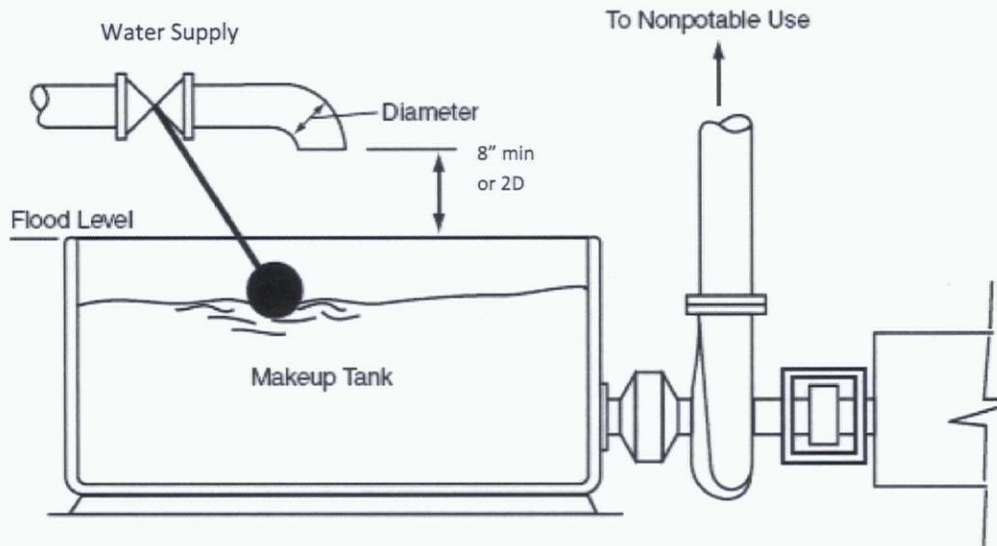
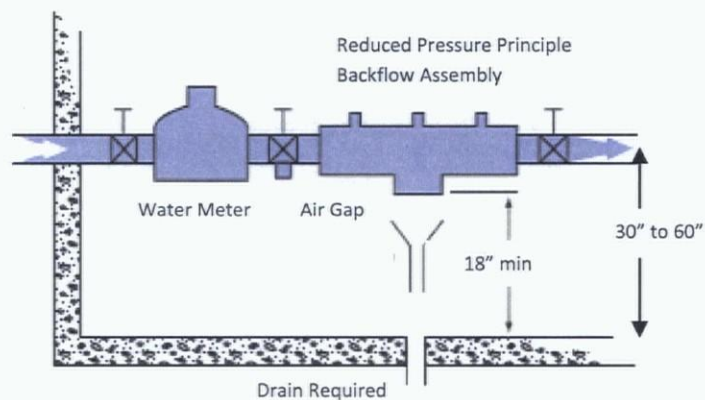


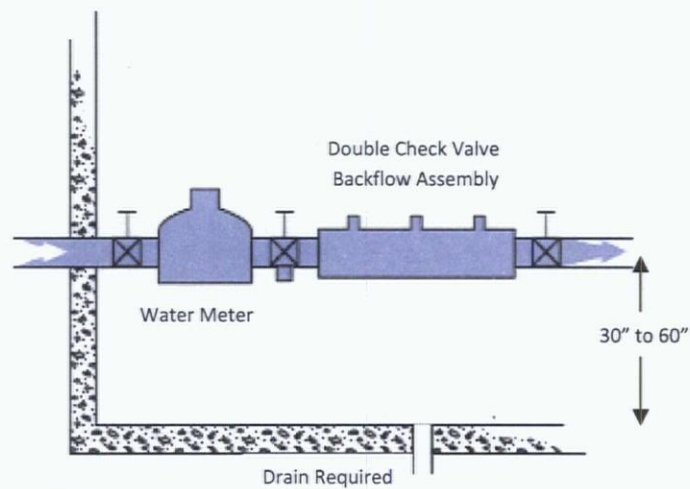
Figure A.1 – Air Gap Assembly



Notes:

1. A minimum of 12" above device is required for operation of valves and maintenance.
2. Assembly to be set 30" minimum from front side of assembly to wall.
3. Assembly to be set 8" minimum from back side of assembly to wall.
4. Assembly to be installed above flood elevation

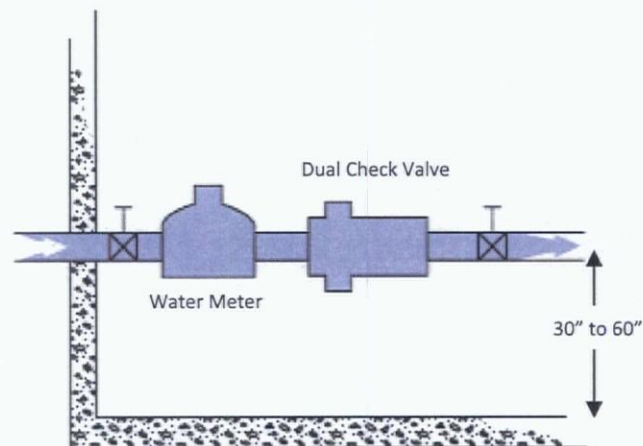
Figure A.2 – Reduced Pressure Principle Backflow Assembly



Notes:

1. A minimum of 12" above device is required for operation of valves and maintenance.
2. Assembly to be set 30" minimum from front side of assembly to wall.
3. Assembly to be set 8" minimum from back side of assembly to wall.
4. Assembly to be installed above flood elevation

Figure A.3 – Double Check Valve Backflow Assembly



Notes:

1. A minimum of 12" above device is required for operation of valves and maintenance.
2. Assembly to be set 30" minimum from front side of assembly to wall.
3. Assembly to be set 8" minimum from back side of assembly to wall.
4. Assembly to be installed above flood elevation

Figure A.4 – Dual Check Valve

Appendix B – Backflow Prevention Field Test Report Form



Commonwealth of Virginia
County of Fairfax
Department of Public Works and Environmental Services
Land Development Services

NOTICE OF INSPECTION

In accordance with the provisions of the Virginia State Waterworks Regulation and the Virginia Statewide Building Code, all testable backflow prevention devices must demonstrate satisfactory operation through periodic testing. Please have the inspection performed by a certified Cross Connection Prevention Device Tester (*) within 30 days (plus or minus) of _____. Additional information relative to this matter may be obtained by writing to Commercial Inspections Division, Cross Connections Section, 12055 Government Center Parkway, Fairfax, VA 22035-5504 or by calling 703-324-1910, TTY 711.

** An individual who has successfully completed a course in "Cross Connection Device Inspection and Maintenance" recognized by Fairfax County.*

Sincerely,

L. R. Pylant, Director
Commercial Inspections Division

RETURN TO:

Commercial Inspections Division
Cross Connection Section
12055 Government Center Parkway, Fairfax, VA 22035-5504
FAX 703-324-1846

ID #:
Name:
Address:
Map Grid:

Size, Manufacturer's Name, Type of Device, Serial #	Initial Test Pass/Fail	Repaired Yes/No	Tested After Repair Pass/Fail

NOTE: All repairs/replacements shall be completed within 10 days.

Above Data Certified to be Correct:

Date Tested: _____ Signature of Tester: _____ Cross Connection School Certified By: _____

NOTICE

Prior to testing any portion of a fire protection/sprinkler system, you must first notify the Fairfax County Public Safety Center at 703-691-2131 that the system is being taken out of service. After completion of testing you must again call the above number to report the system back in service. Failure to follow the above instructions will result in a false alarm, and the responsible party may be subject to penalties.

ALL PREVIOUS FORMS ARE OBSOLETE.

REVISED 8/09

Appendix C

Reuse Service Agreement Template

AGREEMENT FOR THE SALE, DELIVERY, AND USE OF RECLAIMED WATER

THIS AGREEMENT is entered into this _____ day of _____, 20__, between _____ (the "User") and FAIRFAX COUNTY, a Virginia body politic and corporate (the "County").

WITNESSETH:

WHEREAS, the County owns, maintains and operates the Noman M. Cole Jr. Pollution Control Plant (NMPCP), a wastewater treatment and reclamation facility that produces treated effluent that meets or surpasses the water reutilization standards of the Virginia Water Reclamation and Reuse Regulations (the "Reuse Regulations") codified at 9 VAC25-740-10 through 9VAC25-740-210 of the Virginia Administrative Code ("Reclaimed Water"); and

WHEREAS, the County desires to find beneficial uses for the Reclaimed Water that is produced by the NMPCP; and

WHEREAS, the County is willing to sell and the User is willing to purchase Reclaimed Water, pursuant to the terms of this Agreement for the Delivery and Use of Reclaimed Water (the "Agreement"); and

WHEREAS, the Parties recognize and acknowledge that implementation of this Agreement significantly: (i) enhances the conservation of vital water resources; and (ii) promotes a variety of associated environmental benefits.

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants contained herein, the County and User do hereby agree as follows:

1. DEFINITIONS

A. "Average Daily Flow" means the total flow delivered to the User over a period of a month divided by the number of days in that month.

B. "Bulk Irrigation" means the use of reclaimed water for the irrigation of an area greater than five acres on one contiguous property.

C. "County System" is defined as all piping, tanks, pumps, and appurtenances required for delivery of Reclaimed Water upstream of, and including the billing meter.

D. "Nonpotable water" means any water, including Reclaimed Water, not meeting the definition of potable water.

E. "Potable water" means water fit for human consumption and domestic use that is sanitary and normally free of minerals, organic substances, and toxic agents in excess of reasonable amounts for domestic usage in the area served and normally adequate in quantity and quality for the minimum health requirements of the persons served.

F. "Reclaimed Water" means water resulting from the treatment of domestic, municipal, or industrial wastewater that is suitable for a water reuse that would not otherwise occur.

G. "Reclaimed Water Rate" means the fee (\$/1000 gal) charged to, and paid by, the User for the reclaimed water.

H. "Reuse" or "water reuse" means the use of Reclaimed Water for a direct beneficial use, an indirect potable reuse, or a controlled use in accordance with the Water Reclamation and Reuse Regulation, 9VAC25-740.

I. "User System" is defined as all reclaimed water piping and appurtenances downstream of the billing meter, including backflow prevention devices.

2. SALE OF RECLAIMED WATER

A. Subject to the provisions of 2-E, the County agrees to sell and deliver to the User and the User agrees to purchase and accept from the County _____ gallons per day of Reclaimed Water derived from the County's Reclaimed Water production, storage and distribution systems (the "County's System").

B. For the remainder of the calendar year following the date on which the County begins providing Reclaimed Water to the User (the "Acceptance Date"), the Reclaimed Water rate will be set at \$ _____ per thousand gallons (the "Initial Rate"). Thereafter the Reclaimed Water Rate shall be such rate as the County sets annually for Reclaimed Water. The County agrees to notify the User at least ninety days prior to the implementation of any amended Reclaimed Water Rate Schedule.

C. On or before the twenty-fifth day of each new calendar quarter, the County shall render an invoice to the User for the Reclaimed Water delivered during the preceding quarter.

D. Full payment of all invoices is due within 30 days of the date of issuance. If the User fails to timely fully pay any of the charges as herein provided, a late payment charge equal to ten percent (10%) of the amount due shall be added to the amount billed and shall be paid to the County by the User. Failure to fully pay any charge within 60 days of the issuance of an invoice for such charge shall constitute an event of default.

E. The User's payment to the County pursuant to the terms of this Agreement shall not create or constitute any ownership interest or title by the User in or to any part of the County's System.

3. DELIVERY AND DISTRIBUTION OF RECLAIMED WATER

A. The County will deliver Reclaimed Water to the User at the following location(s): _____ (the "Property"). See **Exhibit A**.

B. The County's System shall extend downstream into the Property to the connection point on the volumetric flow meter (the "Point of Delivery"). See **Exhibit A**. The County is

responsible for operating and maintaining the County's System, including those components located on the Property up to the Point of Delivery and including the volumetric flow meter. The User shall own, operate, and maintain all those components of the Reclaimed Water delivery system downstream of the flow meter (the "User System").

C. The User is responsible for constructing all pipes, connections, and appurtenances necessary to obtain Reclaimed Water from the Point of Delivery. Construction shall be in accordance with plans and specifications previously reviewed and approved by the County, final copies of which shall be submitted to the County for its records no more than thirty (30) calendar days subsequent to completion of construction.

D. All Reclaimed Water metering facilities installed at the Point(s) of Delivery are and shall remain the property of the County; said metering facilities being identified and described as follows:

Metering Location	Meter Size	Meter Number

E. The County will operate and maintain all Reclaimed Water metering facilities, including periodic testing thereof; and whenever it determines that replacement of any metering facility is required, it will install, operate and maintain such replacement/new metering facility as may be reasonably required in terms of then current waterworks industry standards for accuracy so as to insure accurate measurement of the quantities of Reclaimed Water delivered by the County to the User at each delivery location.

F. For facilities with multiple Points of Delivery, the aggregate of the quantities of Reclaimed Water delivered by the County to the User as measured by each of the metering facilities that are installed shall be considered to be the total amount of Reclaimed Water delivered by the County to the User during any specified period of time.

G. User grants the County easements in gross across and under the Property for the installation, operation, and maintenance of County's System pipes and appurtenances up to the Point of Delivery and for access to and inspection of the Reclaimed Water System (the "Easements"). The Deed of Easements, which includes a legal description of the Property, is attached hereto as **Exhibit B**, and incorporated by reference and made a part of this Agreement. Upon full execution of the Deed of Easements, it shall be recorded in the land records of Fairfax County, Virginia.

H. User shall provide the County with a sworn certificate of ownership and encumbrances regarding the Property. User is responsible for obtaining and presenting to the County, the consent to the use of reclaimed water on the property of all owners and mortgagees

and any other person with a record interest in the Property [prior to the expiration date of this Agreement and the Easements] as a precondition to receipt of Reclaimed Water Services.

4. TERM OF THE AGREEMENT

A. This Agreement is in effect from the date that it is signed by both parties and, unless sooner terminated, shall be effective for a period of _____ () years commencing on the date of execution of this Agreement.

B. Provided the User is not in default or breach of this Agreement, it may renew this Agreement by providing written notice to the County not less than ninety calendar (90) days in advance of the termination of the then current term.

5. USE OF RECLAIMED WATER

A. User shall use the Reclaimed Water for the following non-potable reuse purposes categorized in the Virginia Reuse Regulations (9VAC25-740-90): _____

The User agrees to use the Reclaimed Water in accordance with Virginia Reuse Regulations, all federal, state, and local regulations, and the requirements of this Agreement including all applicable Exhibits. Refer to **Exhibits C and D** for additional requirements for Irrigation and Process Water use respectively.

B. Not less than one hundred twenty calendar (120) days prior to the anticipated date of initiating additional reuses not identified in this Agreement, User shall provide a written request for approval to the County. The County shall review these proposed additional uses and may disapprove any proposed use. User shall not initiate proposed additional water reuses until an amendment to this Agreement is executed which documents the additional uses and any additional requirements relating to the additional uses.

C. The User agrees that all reclaimed water it purchases under this Agreement is for its sole use. The User will not resell the reclaimed water or allow any other industry or persons to use the reclaimed water.

6. QUALITY OF RECLAIMED WATER SUPPLY

A. The County shall provide the User Level 1 quality reclaimed water, as defined by the State Regulations for Reclaimed Water use in 9VAC25-740-70.

B. The County makes no other warranty, and specifically makes no implied warranty, of merchantability or of fitness of the Reclaimed Water for any particular reuse or purpose.

C. In the event of Reclaimed Water quality deterioration, the County will inform the User as soon as practicable after the County identifies such deterioration and will discontinue delivery of Reclaimed Water until the quality is restored to level required by the Reuse Regulations in accordance with 9VAC25-740-170.A.2.

7. DELIVERY OF RECLAIMED WATER UNDER ADVERSE CONDITIONS

A. **[OPTIONAL: INCLUDE ONLY IF ASKING FOR A MINIMUM DRAW PER DAY]** Substantial rainfall or unforeseen circumstances beyond the User's control may affect its need for Reclaimed Water. The User may reduce the quantity of Reclaimed Water used to match its reduced needs or to accommodate such unforeseen circumstances provided that, if the User's reduced needs will extend for a period of twenty (20) days or more, the User shall provide a written notice to the County of its reduced needs at least seven (7) calendar days prior to initiating the reduction.

B. Adverse weather conditions or unforeseen circumstances may also result in a greater need for Reclaimed Water. **[Insert this if Section 2A uses a max GPD limit: The User may draw additional water, subject to availability of the County's Reclaimed Water supplies, to the maximum amount specified in Section 2A.]**

C. The County shall furnish only such Reclaimed Water as the reclamation, transmission and delivery systems are capable of handling.

8. OUTAGES

The User shall provide to the County in writing the dates and times of all scheduled outages a minimum of five (5) five days prior to the determined outage, and will further make its best efforts to notify the County thirty (30) days prior to such scheduled outages. In order to facilitate the best possible coordination between the parties, the User agrees to provide the County five days oral notice, followed by written notice as soon as possible for all unscheduled outages.

9. INABILITY TO DELIVER RECLAIMED WATER

A. If circumstances beyond the County's control prevent the full or partial delivery of Reclaimed Water as provided herein ("Interruption of Service"), the County shall promptly notify the User by telephone.

B. The County shall provide the User forty eight (48) hours advanced notification of any planned service disruption.

10. CROSS-CONNECTION AND BACKFLOW PREVENTION

A. Direct cross-connections between the User's System and any potable water supply system are not permitted.

B. The User shall maintain the cross connection and back flow protection equipment in accordance with the Virginia Waterworks Regulations (12VAC5-590-580 et seq.), the Uniform Statewide Building Code, the County's Cross Connection/Backflow Prevention Program, and local building and plumbing codes. The User shall allow the County access to the facility to provide inspection of the cross-connection and backflow prevention measures in accordance with the Fairfax County Reclaimed Water Management (RWM) Plan.

C. The User may utilize potable water as a supplementary water source to the User's System, provided there are no announced legal restrictions on such use, and there is an air gap separation of at least two times the pipe diameter between the potable water and the Reclaimed Water or a reduced pressure principle backflow prevention device installed at the potable service connection to the reuse.

D. User shall bear the cost of all backflow prevention devices in the User's System. The County takes no responsibility for the operation and maintenance of the backflow prevention device(s).

11. OPERATION AND MAINTENANCE

A. The User shall prepare an operations and maintenance manual for its System, which shall include, at a minimum, contain the following:

(i) A description of all components of the User's System and step-by-step instructions for operation of specific mechanical components.

(ii) A program for routine and unplanned inspection of the User's System, including required inspections for the cross-connection and backflow prevention system program as specified in 9VAC25-740-100.C.1.g. of the Reuse Regulations.

(iii) Routine maintenance and schedules of maintenance for all components of the User's System.

(iv) Procedures to handle and dispose of any wastes or wastewater generated by maintenance of the delivery system in a manner protective of the environment.

B. User shall contact the County immediately if the User's System is unable to accept Reclaimed Water.

12. ADVISORY SIGNS

A. Signage shall be posted by the User, as required by Section 9VAC25-740-160 of the Virginia Reuse Regulations, to ensure proper use of Reclaimed Water and to protect the health and safety of the general public. Signage shall be kept in appropriate condition so that the signs are legible and free of debris, vandalism, etc. The County may require the User to post additional signage or replace existing signage if deemed necessary.

13. STORAGE

If the User requires on-site storage of reclaimed water for its purposes, it shall meet the requirements of Section 9VAC25-740-110 of the Virginia Reuse Regulations. The User is required to own, operate, and maintain the User's Reclaimed Water storage facilities.

14. FORCE MAJEURE AND EXCUSE FROM PERFORMANCE BY GOVERNMENTAL ACTS

A. The respective duties and obligations of the parties hereunder shall be suspended while and as long as performance thereto is prevented or impeded by strike, disturbances, riots, fire, severe weather, government action, war acts, acts of God, acts of the County, or any other cause similar or dissimilar to the forgoing which are beyond the reasonable control of the part from whom the affected performance was due.

B. If for any reason during the term of this Agreement, local, state, or federal governments or agencies fail to issue necessary permits, fail to grant necessary approvals, or shall require any change in the operation of the treatment, transmission and distribution systems for Reclaimed Water or the application and use of Reclaimed Water provided by the County, then to the extent that such requirements shall affect the ability of any party to perform any of the terms of this Agreement, the affected party shall be excused from the performance thereof and a new Agreement shall be negotiated by the parties in conformity with such permits, approvals, or requirements.

15. EARLY TERMINATION OR ASSIGNMENT

A. The County retains the right to terminate service at any time, including for any violations of this Agreement or of federal, state, or local regulations pertaining to the approved use and management of Reclaimed Water. The County will provide written notification of service termination to the User thirty (30) days prior to termination of service.

B. This Agreement may not be assigned by the User without the prior written consent of the County.

16. TRANSFER OR MODIFICATION OF USER'S LAND

User's right to alienate or encumber the land described in **Exhibit B** shall not be restricted by this Agreement, except that User shall give the County written notice of any proposed sale or transfer at least thirty (30) days prior to the sale or transfer.

17. DEFAULT

A. The following events shall constitute events of default under this Agreement:

(i) Except as provided in Section 2D, if User fails to keep, perform, or abide by any other term, condition, or covenant of this Agreement to be performed or observed and does not cure such default within thirty (30) days after written notice thereof or, if such default cannot be cured in such period, does not within thirty (30) days commence with diligence and dispatch such act or acts as shall be necessary to cure the default and shall not cure such default within a reasonable time; or

(ii) If any default shall occur under the terms of any agreement between the parties for potable water service or sanitary sewer service.

B. Each of the parties hereto shall give the other party written notice of any default hereunder within seven (7) days after having gained knowledge of the default or as soon as possible.

18. REMEDIES FOR DEFAULT

A. In the event of a default, at any time thereafter the non-defaulting party may terminate this Agreement by giving at least thirty (30) days prior written notice (the "Notice of Termination") to the defaulting party and this Agreement shall terminate after the date of such notice.

B. Additionally, the County may, without terminating this Agreement, suspend Reclaimed Water service to User upon thirty (30) days written notice. Such suspension may continue for the period specified in the notice or until such time as the User has corrected any breach of this Agreement to the satisfaction of the County. At the end of the period of suspended service, if the User has not corrected the breach, the County may terminate this Agreement upon ten (10) days written notice to User.

C. The non-defaulting party also has rights and remedies that may exist under law. All rights and remedies may be exercised successively or concurrently.

D. The sole and exclusive jurisdiction for any litigation arising from or relation to this Agreement shall be in the Circuit Court of Fairfax County, Virginia.

19. ACCESS

The County shall have the right, at all reasonable times, to enter upon the Property to review and inspect the User's System and/or the County's System Reclaimed Water facilities and operations with respect to the conditions agreed upon herein.

20. DISCLAIMER OF THIRD PARTY BENEFICIARIES

This Agreement is solely for the benefit of the parties hereto and no right or cause of action shall accrue to, upon or by reason hereto or for the benefit of any third party not a party hereto.

21. SEVERABILITY

If any part of this Agreement is found invalid or unenforceable by any court, such invalidity or unenforceability shall not affect the other parts of this Agreement if the rights and obligations of the parties contained therein are not materially prejudiced and if the intentions of the parties can continue to be effective. To that end, this Agreement is declared to be severable.

22. BINDING UPON SUCCESSORS

This Agreement shall be binding upon and shall inure to the benefit of the successors or assigns of the parties hereto. The terms and obligations of this Agreement shall run with the land referenced in **Exhibit B** attached hereto.

23. APPLICABLE LAW

This Agreement and the provisions contained herein shall be construed, controlled, and interpreted according to the laws of the Commonwealth of Virginia.

24. NOTICES

Unless otherwise specified in this Agreement, all notices or requests shall be in writing and shall be given by hand delivery or certified mail, return receipt requested, postage prepaid, addressed as follows:

If to the County:

With copies to:

Fairfax County
Attn: Wastewater Management
12000 Government Center Pkwy
Suite 358
Fairfax, VA. 22035
(703) 324 -5030

or to such other persons and places as the parties may specify by notice. The effective date of any notice or request shall be the date of receipt if delivered by hand, or the postmarked date thereof.

If to the User:

With a copy to:

or to such other persons and places as the parties may specify by notice. The effective date of any notice or request shall be the date of receipt if delivered by hand, or the postmarked date thereof.

25. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof. User agrees to abide by federal, state, and local regulations, including, but not limited to, the provisions of the Fairfax County Public Facilities Manual and any policies and procedures which may address Reclaimed Water.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals on the date first above written.

ATTEST:

USER

BOARD OF SUPERVISORS OF FAIRFAX COUNTY, VIRGINIA

BY: _____
Director, Dept. of Public Works and Environmental Services

COMMONWEALTH OF VIRGINIA:

COUNTY OF FAIRFAX:

This ____ day of _____, _____ appeared before me in my State and County aforesaid, _____, Director, Department of Public Works and Environmental Services of Fairfax County, Virginia and acknowledged signature.

My commission expires: _____

NOTARY PUBLIC

EXHIBIT A

LOCATION OF USER'S PROPERTY AND POINT OF DELIVERY (SITE PLAN)

EXHIBIT B

EASEMENT SKETCH AND LEGAL DESCRIPTION

EXHIBIT C

IRRIGATION - ADDITIONAL REQUIREMENTS

1. Irrigation with reclaimed water shall be conducted in a manner that minimizes human contact with reclaimed water.
2. A site plan in accordance with 9VAC25-740-100 C.6 shall be prepared and submitted for all Bulk Irrigation users under Exhibit A. The site plan shall include the following:
 - (i) The boundaries of the irrigation site;
 - (ii) The location of all potable and non-potable water supply wells and springs, public water supply intakes, occupied dwellings, property lines, areas accessible to the public, outdoor eating, drinking and bathing facilities; surface waters, including wetlands; limestone rock outcrops and sinkholes within 250 feet of the irrigation sites; and
 - (iii) Setbacks areas around the irrigation site.
3. The use of reclaimed water for irrigation must be supplemental and is defined as "irrigation, which in combination with rainfall, meets but does not exceed the water necessary to maximize production or optimize growth of the irrigated vegetation." The User agrees to limit irrigation to _____ gallons per season.
4. Only individuals authorized by the User shall be allowed access to irrigation equipment which utilizes reclaimed water. It shall be the responsibility of the User to educate authorized individuals of the irrigation requirements listed in 9VAC25-740 and contained in this Agreement
5. The User shall provide a positive check-valve between the Reclaimed Water System and any other non-potable irrigation water source(s). The User shall be responsible for the cost, installation and complete operation of such check-valve. The User will provide written notification to the County identifying any and all wells or surface water bodies connected to the User's irrigation system.
6. If User is providing bulk irrigation supply, the County may from time to time require rate controls and supply schedules to maintain adequate supply and pressures during periods of peak demands.
7. For all irrigation reuses of reclaimed water, including bulk irrigation reuse, the following shall be required:
 - (i) There shall be no application of reclaimed water to the ground when it is saturated, frozen or covered with ice or snow, and during periods of measurable rainfall,
 - (ii) The chosen method of irrigation shall minimize human contact with the reclaimed water, and
 - (iii) Reclaimed water shall be prevented from coming into contact with drinking fountains, water coolers, or eating surfaces.
8. For bulk irrigation reuse of reclaimed water, the following shall be required:

- (i) Provide uniform distribution of the reclaimed water over the irrigation site,
- (ii) Prevent ponding or pooling of reclaimed water at the irrigation site,
- (iii) Facilitate maintenance and harvesting of irrigated areas and precludes damage to the irrigation system from the use of maintenance or harvesting equipment,
- (iv) Prevent aerosol carry-over from the irrigation site to areas beyond the setback distances, and
- (v) Prevent clogging from algae or suspended solids.
- (vi) Identification of all pipes, pumps, valve boxes and outlets in accordance with 9VAC25-740-110B.
- (vii) Any reclaimed water runoff shall be confined to the irrigation reuse site

9. Setback distances for irrigation reuses of reclaimed water:

- (i) Potable water supply wells and springs, and public water supply intakes 100 feet
- (ii) Non-potable water supply wells 10 feet
- (iii) Limestone rock outcrops and sinkholes 50 feet

Setback distances shall be defined as the minimum spacing that must be provided between a site irrigated with reclaimed water and a specified location (i.e. potable water supply well).

Aerosol formation shall be minimized within 100 feet of occupied dwellings and outdoor eating, drinking, and bathing facilities through the use of low trajectory nozzles for spray irrigation, above-ground drip irrigation, or other means.

10. Overspray of surface waters, including wetlands, from irrigation or other reuses of reclaimed water is prohibited.

EXHIBIT D

PROCESS WATER - ADDITIONAL REQUIREMENTS

Appendix D

Reuse Service Agreement Template – Filling Station

AGREEMENT FOR THE USE OF RECLAIMED WATER

FILLING STATION

THIS AGREEMENT is entered into this _____ day of _____, 20____, between _____ (the "User") and FAIRFAX COUNTY, a Virginia body politic and corporate (the "County").

WITNESSETH:

WHEREAS, the County owns, maintains and operates wastewater treatment and reclamation facilities that produce treated effluent that meets or exceeds the water reutilization standards of the Virginia Water Reclamation and Reuse Regulations (the "Reuse Regulations") codified at 9VAC25-740-10 through 9VAC25-740-210 of the Virginia Administrative Code ("Reclaimed Water"); and

WHEREAS, the County is willing to sell and the User is willing to purchase Reclaimed Water, pursuant to the terms of this Agreement for the Use of Reclaimed Water (the "Agreement"); and

WHEREAS, the County owns, maintains, and operates the Filling Station that can be used to fill a Tank Truck with Reclaimed Water purchased by the User at the Noman M. Cole, Jr. Pollution Control Plant (NMCPCP) that can be transported off-site for approved reuse in accordance with the Reuse Regulations and this Agreement;

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants contained herein, the County and User do hereby agree as follows:

1. SALE OF RECLAIMED WATER

A. The County agrees to sell to the User and the User agrees to purchase from the County such quantities as the User may desire of Reclaimed Water derived from the County's Reclaimed Water production, storage and distribution systems (the "County's System").

B. The User shall pay for Reclaimed Water at the rate of \$_____ per thousand gallons water used or fraction thereof.

C. The User agrees to pay to the County at the time an invoice is due a fee of \$_____ a month for the possession and use of the following filling station meter number _____ during the continuance of this Agreement.

D. Upon execution of this Agreement [or within ____ days of execution], the User shall deposit with the County the sum of \$_____ as security for the payment of Reclaimed Water charges and use of the filling station meter. The security deposit shall be returned to the User at the expiration of this Agreement, and upon the return of the filling station meter, provided all the terms and conditions of this Agreement have been met by the User. The security deposit may be used against any billing that is due and outstanding at the time of termination of this Agreement or any costs to repair or replace a filling station meter which has been lost or damaged beyond that which can be expected by normal wear and tear.

E. The User shall on or before the 3rd of each month during the term of this Agreement bring the filling station meter in for reading and physical inspection by the County at NMCCPCP. If the User fails to do so it will agree and accept to pay the billing from the County that is equivalent to the use of 100,000 gallons of Reclaimed Water for that month. If the User brings the filling station meter in for reading, before the billing date, the User will be billed for the actual amount of water used as determined by the filling station meter.

F. Full payment of all invoices is due within 30 days of the date of issuance. If the User fails to timely fully pay any of the charges as herein provided, a late payment charge equal to ten percent (10%) of the amount due shall be added to the amount billed and shall be paid to the County by the User. Failure to fully pay any charge within 60 days of the issuance of an invoice for such charge shall constitute an event of default and will result in the loss of the security deposit and termination of the agreement. If the charges are greater than the security deposit an invoice shall be sent to the User for the remaining charges owed to the County.

G. The User's payment to the County pursuant to the terms of this Agreement shall not create or constitute any ownership interest or title by the User in or to any part of the County's System including the filling station meter.

H. Connection to the Reclaimed Water Filling Station shall be of a type, or secured in a manner, that permits operation by authorized personnel. All equipment used at the Reclaimed Water Filling Station shall differ materially from those used on the potable water supply and be clearly distinguished as Reclaimed Water equipment (i.e., painted purple, valve operation with a special tool).

2. TERM OF THE AGREEMENT

A. This Agreement shall remain in effect for one (1) year commencing on the Effective Date.

3. USE OF RECLAIMED WATER

A. User shall use the Reclaimed Water for non-potable purposes as categorized in the Virginia Reuse Regulations (9VAC25-740-90) and in a manner consistent with all federal, state, and local regulations.

B. The User agrees that all Reclaimed Water it purchases under this Agreement is for its sole use. The User will not resell the Reclaimed Water or allow any other industry or persons to use the Reclaimed Water.

C. The follow uses are prohibited for the Reclaimed Water:

- (i) Human Consumption;
- (ii) Any use inside a residential or domestic dwelling or a building containing a residential or domestic unit;
- (iii) Filling of residential swimming pools, hot tubs or wading pools;

(iv) Food preparation or incorporation as an ingredient into food or beverage for human consumption;

(v) Filling of Ponds or other Water Impoundments;

(vi) Filling of any tank or water container that may otherwise be used to store potable water in the future;

D. The return of Reclaimed Water to the Reclaimed Water distribution system after the Reclaimed Water has been delivered to an end user is prohibited.

E. Irrigation with Reclaimed Water

(i) Irrigation with Reclaimed Water shall not take place during use of the reuse site by the general public.

(ii) For all irrigation reuses of Reclaimed Water, including bulk irrigation reuse, the following shall be required:

(1) There shall be no application of Reclaimed Water to the ground when it is saturated, frozen or covered with ice or snow, and during periods of rainfall,

(2) The chosen method of irrigation shall minimize human contact with the Reclaimed Water, and

(3) Reclaimed Water shall be prevented from coming into contact with drinking fountains, water coolers, or eating surfaces.

(iii) For bulk irrigation reuse of Reclaimed Water, the following shall be required:

(1) Provide uniform distribution of the Reclaimed Water over the irrigation site,

(2) Prevent ponding or pooling of Reclaimed Water at the irrigation site,

(3) Facilitate maintenance and harvesting of irrigated areas and precludes damage to the irrigation system from the use of maintenance or harvesting equipment,

(4) Prevent aerosol carry-over from the irrigation site to areas beyond the setback distances, and

(5) Prevent clogging from algae or suspended solids.

(iv) Any Reclaimed Water runoff shall be confined to the irrigation reuse site

(v) Setback distances for irrigation reuses of Reclaimed Water:

- | | |
|---|----------|
| (1) Potable water supply wells and springs, and public water supply intakes | 100 feet |
| (2) Non-potable water supply wells | 10 feet |
| (3) Limestone rock outcrops and sinkholes | 50 feet |

Setback distances shall be defined as the minimum spacing that must be provided between a site irrigated with reclaimed water and a specified location (i.e. potable water supply well).

Aerosol formation shall be minimized within 100 feet of occupied dwellings and outdoor eating, drinking, and bathing facilities through the use of low trajectory nozzles for spray irrigation, above-ground drip irrigation, or other means.

(vi) Overspray of surface waters, including wetlands, from irrigation or other reuses of Reclaimed Water is prohibited.

F. Reclaimed Water shall not be discharged to surface waters or storm sewers. All Reclaimed Water that is not used within 72 hours of purchase at the filling station shall be discharged to the plant headworks at the Noman M. Cole Jr. Pollution Control Plant.

4. QUALITY OF RECLAIMED WATER SUPPLY

A. The County shall provide the User Level 1 quality Reclaimed Water, as defined by the State Regulations for Reclaimed Water use in 9VAC25-740-70.

B. The County makes no other warranty, and specifically makes no implied warranty, of merchantability or of fitness of the Reclaimed Water for any particular reuse or purpose. Specifically, the County makes no representation concerning productivity of properties irrigated with Reclaimed Water, or potential changes to the land, crops, or vegetation. Further, any plans, specifications, water quality analysis or reclaimed wastewater sampling will serve to merely indicate the general quality of Reclaimed Water that will be delivered to the User. Such plans, specifications, water quality analyses or treated water samples create no warranty that the Reclaimed Water delivered by the County will conform to these samples.

C. The County shall monitor the water quality in accordance with the Reclaimed Water Monitoring Requirement for Reuse, 9VAC25-740-80. The County shall provide the User the most recent water quality report on the Effective Date and thereafter, upon request, a monthly summary report for the duration of this Agreement that includes Reclaimed Water quality data on five-day carbonaceous biochemical demand (CBOD₅), total residue chlorine (TRC), turbidity, and E. coli, as measured at the NMCCPCP effluent. The County will give the User the right to take a concurrent sample for independent analysis upon request.

5. USE OF EQUIPMENT

A. The User shall use the filling station meter only in the manner for which it was designed and intended and so as to subject it only to ordinary wear and tear. The User shall indemnify and hold the

County harmless from any and all fines, forfeitures, damages or penalties resulting from violations by the User.

B. The County is responsible for the maintenance and calibration of the filling station meter.

C. If the filling station meter is lost, stolen, or willfully or accidentally destroyed, the User will notify the County immediately in writing and use all reasonable endeavors at the User's own expense to recover the meter.

6. CROSS-CONNECTION AND BACKFLOW PREVENTION

A. Direct cross-connections between the User's System and any potable water supply system are not permitted. User's System shall be defined as all pipes, pumps, tanks, equipment, etc. that receive Reclaimed Water.

B. A backflow prevention device in accordance with Fairfax County's Cross Connection Control / Backflow Prevention Program Manual shall be required at the filling station. The County is responsible for the installation and maintenance of the backflow prevention device.

7. TRANSPORTATION OF RECLAIMED WATER

Tank trucks may be used to transport and distribute Reclaimed Water only if the following requirements are met:

A. The truck is not used and will not be used to transport potable water that is used for drinking water or food preparation;

B. The truck is not used to transport waters or other fluids that do not meet the requirements specified in 9VAC25-740, unless the tank has been evacuated and properly cleaned prior to the addition of the Reclaimed Water. The truck shall not be used to transport wastewater, septage, or sludge;

C. The truck is not filled through on-board piping or removable hoses that may subsequently be used to fill tanks with water from a potable water supply;

D. The Reclaimed Water contents of the truck are clearly identified as non-potable water on the truck;

E. Control valves shall be provided such that Reclaimed Water can be applied in a controlled fashion on the reuse site and completely retained during transit to all other areas;

F. Spray heads or other nozzles shall be provided and configured such that the Reclaimed Water is uniformly applied and runoff, ponding, or windblown spray conditions are minimized; and

G. Each tank shall be equipped with an approved air-gap separation.

8. OPERATION AND MAINTENANCE

A. User will take all reasonable precautions, including signs and labeling, to clearly identify Reclaimed Water systems to prevent inadvertent human consumption.

B. The User shall provide signage, as required by Section 9VAC25-740-160 of the Virginia Reuse Regulations, to ensure proper use of Reclaimed Water and to protect the health and safety of the general public. Signage shall be kept in appropriate condition so that the signs are legible and free of debris, vandalism, etc. The County may require the User to post additional signage or replace existing signage if deemed necessary.

9. EARLY TERMINATION

A. The County retains the right to terminate service at any time, including for any violations of this Agreement or of federal, state, or local regulations pertaining to the approved use and management of Reclaimed Water.

B. The User retains the right to terminate this Agreement at any time upon return of the filling station meter in good condition, excepting normal wear and tear.

10. DISCLAIMER OF THIRD PARTY BENEFICIARIES

This Agreement is solely for the benefit of the parties hereto and no right or cause of action shall accrue to, upon or by reason hereto or for the benefit of any third party not a party hereto.

11. SEVERABILITY

If any part of this Agreement is found invalid or unenforceable by any court, such invalidity or unenforceability shall not affect the other parts of this Agreement if the rights and obligations of the parties contained therein are not materially prejudiced and if the intentions of the parties can continue to be effective. To that end, this Agreement is declared to be severable.

12. NON-ASSIGNABILITY

The terms and obligations of this Agreement shall be between the County and User and shall not be transferred to the successors or assigns of the parties hereto.

13. APPLICABLE LAW

This Agreement and the provisions contained herein shall be construed, controlled, and interpreted according to the laws of the Commonwealth of Virginia.

14. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement between the parties. User agrees to abide by the provisions of the Fairfax County Public Facilities Manual and any policies and procedures which may address Reclaimed Water. Except as may be provided by Fairfax County Public Facilities Manual,

policies or procedures, modifications to and waivers of the provisions herein shall not be binding unless made in writing and signed by the parties hereto.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals on the date first above written.

ATTEST:

USER

ATTEST:

FAIRFAX COUNTY

By: _____
Director, Department of Public Works and
Environmental Services

Appendix E

Best Management Practices for Irrigation with Reclaimed Water

Best Management Practices for Irrigation with Reclaimed Water

Public and Worker Protection

1. Advisory signs shall be posted, in accordance with 9VAC25-740-160, to warn individuals that reclaimed water is used for irrigation at the following locations:
 - a. Signs shall be posted by the Owner within and at the boundaries of reuse areas. The advisory signs shall be posted at entrances to residential neighborhoods where reclaimed water is used, at the entrance to parks irrigated with reclaimed water, at the first and tenth tees at golf courses irrigated with reclaimed water, and all other approved locations where reclaimed water is used for irrigation. Advisory signs shall read at a minimum "Caution: Property Irrigated with Reclaimed Water – Do not drink from the irrigation system."
 - b. All reclaimed water outlets shall have signs posted that read at a minimum "Caution: Reclaimed Water – Do not drink."
 - c. Signs shall be posted adjacent to impoundments or ponds, including landscape impoundments, used for non-system storage of reclaimed water.
2. An education program shall be conducted, in accordance with 9VAC25-740-170.A-1, to ensure that end users and the public likely to have contact with reclaimed water are informed of the origin, nature, and characteristics of the reclaimed water; the manner for which the reclaimed water can be used safely; and uses for which the reclaimed water is prohibited or limited. The program shall commence at the time of initial connection.
3. Pamphlets shall be made available at all golf courses and public parks that irrigate with reclaimed water. The pamphlets shall describe reclaimed water use and quality, explain the significance of purple color coding for reclaimed water pipes and outlets, and list the times the property will be irrigated with reclaimed water.
4. At golf courses, notices shall be printed on score cards in a conspicuous size and color stating "Reclaimed Water Used."
5. Adequate measures shall be taken to prevent body contact activities, such as wading or swimming, at restricted recreational impoundments containing reclaimed water. All water hazards containing reclaimed water shall be posted with signs.
6. Irrigation with reclaimed water should only occur at times the property is not regularly used by the public or personnel. Consideration should be given to allow adequate "dry-out" time before the irrigated property will be used by the public or personnel.

7. If irrigation is necessary when the property is currently occupied by the public provide additional signage and controls to prevent public contact. Rope off or provide construction cones and signage (such as "Area is currently being irrigated with reclaimed water - Do not enter") around all areas that are irrigated with reclaimed water while the public is present.
8. All reclaimed water pipe and fixtures shall have the following identification, notification and signage:
 - a. All reclaimed water piping shall have the words "CAUTION: RECLAIMED WATER - DO NOT DRINK" embossed, integrally stamped, or otherwise affixed to the piping, and shall be identified by one or more of the following methods:
 - i. Painting the piping purple (Pantone 522) and stamping the piping with the required caution statement on opposite sides of the pipe, repeated at intervals of three feet or less.
 - ii. Using stenciled pipe with two- to three- inch letters on opposite sides of the pipe, placed at intervals of three to four feet. For pipes less than two inches in diameter, lettering shall be at least five eighths inch, placed on opposite sides of the pipe, and repeated at intervals of one foot.
 - iii. Wrapping the piping with purple (Pantone 522) polyethylene vinyl wrap or adhesive tape, placed longitudinally at three-foot intervals. The width of the wrap or tape shall be at least three inches, and shall display the required caution statement in either white or black lettering.
 - iv. Permanently affixing purple (Pantone 522) vinyl adhesive tape on top of the piping, parallel to the axis of the pipe, fastened at least every ten feet to each pipe section, and continuously for the entire length of the piping. The tape shall display the required caution statement in either white or black lettering.
 - b. All visible, above- ground reclaimed water pipe and fixtures shall be colored coded, taped, labeled, tagged or otherwise marked to notify the public and employees that the source of the water is reclaimed water, not intended for drinking or food preparation.
 - c. Each mechanical appurtenance of a reclaimed water system shall be colored purple and legibly marked "RECLAIMED WATER" to identify it as a part of the reclaimed water system and to distinguish it from mechanical appurtenances of a potable water distribution system or a wastewater collection system.
 - d. Existing underground distribution or collection pipelines and appurtenances retrofitted for the purpose of distributing reclaimed water shall be colored coded, taped, labeled, tagged or otherwise identified as described above. This identification need not extend the entire length of the retrofitted reclaimed water distribution system but is required within 10 feet of locations where the system crosses a potable water supply line or sanitary sewer line.
 - e. Valve boxes for reclaimed water systems shall be painted purple. Valve covers for reclaimed water lines shall not be interchangeable with potable water supply valve covers.

9. All reclaimed water connections shall be of a type, or secured in a manner, that permits operation by authorized personnel. Public access to reclaimed water connections shall be controlled in areas where reclaimed water connections are accessible to the public as follows:
 - a. If quick connection couplers are used on above-ground portions of the reclaimed water system, they shall differ materially from those used on the potable water supply.
 - b. Use of above- ground hose bibs, spigots or other hand-operated connections that are standard on local potable water distribution systems shall be prohibited for use on the reclaimed water system. If above-ground hose bibs, spigots or other hand-operated connections are used on the reclaimed water system, they shall differ materially from those used on the local potable water distribution system and shall be clearly distinguishable as reclaimed water connections (i.e., painted purple, valve operation with a special tool) so as not to be mistaken for potable water connections. Where below-grade vaults are used to house reclaimed water connections, the connections in the vault may have standard potable water distribution system thread and bib size services provided the bib valves can be operated only by a special tool. The below-grade vaults shall also be labeled as being part of the reclaimed water system (i.e., painted purple, labeled).
10. All drinking fountains located within areas irrigated with reclaimed water shall be protected from contact with reclaimed water spray, mist, or runoff.
11. Workers shall be provided with protective clothing when there will be more than casual contact with the reclaimed water.

Irrigation Conditions

1. All irrigation with reclaimed water shall be limited to areas approved for reuse.
2. Using reclaimed water in a manner that would spray directly into surface water bodies or allow runoff to surface water bodies is prohibited.
3. For all irrigation with reclaimed water:
 - a. Do not irrigate with reclaimed water when the ground is saturated, frozen, or covered with ice or snow, and during periods of rainfall.
 - b. Irrigate using equipment (e.g. sprinkler heads) that minimizes human contact with the reclaimed water.
 - c. Prevent reclaimed water from coming into contact with drinking fountains, water coolers, picnic tables, or eating surfaces.
 - d. Provide uniform distribution of the reclaimed water over the irrigation site.
 - e. Prevent ponding or pooling of reclaimed water at the irrigation site.
 - f. Avoid damaging the reclaimed water system during mowing or other maintenance operations.
 - g. Prevent aerosol carry-over from the irrigation site to areas beyond the setback distances. Avoid using reclaimed water in windy conditions.
 - h. Prevent clogging of sprinkler heads from algae or suspended solids.
 - i. Confine reclaimed water runoff to the irrigation site.

4. Apply reclaimed water in a manner to maintain the following distances between water bodies and reclaimed water use:
 - a. Potable water supply wells and springs, and public water supply intakes 100 feet
 - b. Non-potable water supply wells 10 feet
 - c. Limestone rock outcrops and sinkholes 50 feet

Aerosol formation shall be minimized within 100 feet of occupied dwellings and outdoor eating, drinking, and bathing facilities through the use of low trajectory nozzles for spray irrigation, above-ground drip irrigation, or other means.

Management

1. All irrigation reuses of reclaimed water shall be supplemental irrigation, which in combination with rainfall, meets but does not exceed the water necessary to maximize production or optimize growth of the irrigated vegetation. The rate of supplemental irrigation shall be recorded for every day that irrigation with reclaimed water occurs. The rate of irrigation with reclaimed water shall be calculated using the Penman method. This method includes the following equation:

$I_r = ((ET_p * K_c) - re)$, where,

I_r = irrigation requirement

ET_p = potential evapotranspiration for clipped grass in inches per day (in/d)

K_c = crop coefficient for turf grass (typical value 0.6 to 0.8)

re = effective precipitation coefficient (typical value .15 to .51, use .5 for this area)

2. The duration or length of an irrigation cycle (run time) should be long enough to fill up the root zone reservoir. A common and important exception to this rule is to reduce levels of salts in the root zone reservoir. This is accomplished by applying additional water to force salts down past the root zone. This process, called leaching, is a common use of irrigation water. Where a user demonstrates that salts will accumulate or have accumulated to undesirable levels in the soil of the irrigation reuse site and the application of reclaimed water will not contribute or has not contributed significantly to the salt problem, and additional volume of reclaimed water less than or equal to ten percent of the water lost to Evapotranspiration by the irrigated vegetation may be used for leaching. If the application of reclaimed water is identified as a primary or significant source of the salts, no volume of reclaimed water may be used to leach salts from soils at the irrigation reuse site.
3. Use automatic rain shut-off devices to reduce irrigation if significant rainfall occurs. Use multiple rain shut-off devices to reduce ponding if precipitation rate is higher than infiltration rate of the soil.
4. Use automatic flow control devices that shut down a system if a break or other similar high flow/low pressure situation develops during irrigation. These devices can save significant amounts of water and virtually eliminate runoff and ponding should a break occur.

5. The use of centralized control systems or controllers that measure or can be programmed to use evaporation rates or systems that use controls such as moisture sensors is recommended.

Routine maintenance

1. Adjust sprinkler heads so they achieve 80% head to head coverage though out their intended arc. There should be no obstruction that would interfere with the free rotation and smooth operation of any sprinkler, such as trees, tall grass, shrubs, signs, etc. The system should be tested during the daytime so adjustments can be made.
2. Adjust valves or pressure regulators so that the systems are operating at the pressure required by the sprinkler heads or emitters. Test pressures periodically with a pressure gauge to maintain appropriate pressure levels.
3. Routinely test the accuracy of time clocks. Have the time clock recalibrated or repaired as necessary.
4. Repair or replace broken risers, sprinklers, valves, etc. as soon as they are discovered. Replace with appropriate make and model of equipment to maintain uniformity throughout the system.
5. Routinely check backflow devices, pumps, etc. for leaks and repair or replace as necessary.
6. Routinely clean screens and backwash filters to keep systems operating optimally.
7. The area shall be maintained to prevent the breeding of flies, mosquitoes or other vectors.

Appendix F

Bulk Irrigation Site Plans



